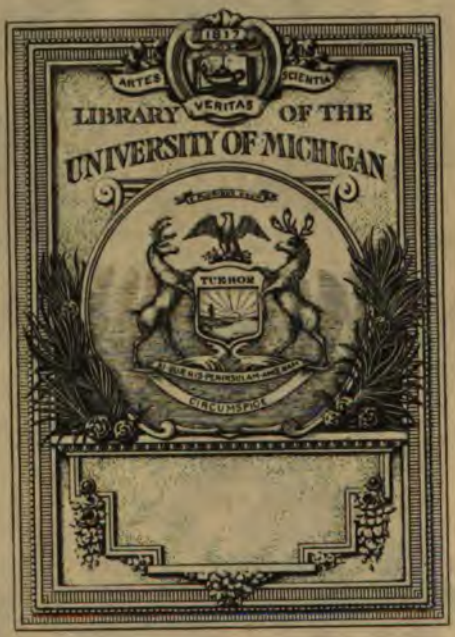
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PAINTING AND INTERIOR DECORATION
HISTORY OF ARCHITECTURE AND ORNAMENT

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CONTENTS

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PAINTING AND INTERIOR DECORATION

INTRODUCTION

1. The architect superintending the work of the painter should possess sufficient knowledge of the trade to criticize the character of the workmanship and materials in an intelligent manner.

The utilitarian phase of painting becomes an element of architectural value only when considered in conjunction with its decorative effect, wherein it combines the useful with the beautiful, making each administer to, and enhance the value of, the other.

The theory and practice of the painter's art may therefore be divided into two parts; namely, *plain-surface painting* and *interior decoration*. The former deals with pigments—their processes of manufacture, methods of application, durability and utility—while the latter discusses the character of the material painted, the combination of colors, and the preliminary treatment of surfaces that are to receive the color, exclusively in consideration of the decorative effect.

Paint is laid over a surface primarily to preserve it from the effects of the atmosphere. Woodwork when not protected will swell with dampness and shrink as it dries, and in time will crack and rot. Iron when exposed to the weather will rust itself away. Paint will protect both of these materials from the deteriorating effects of moisture; or, where the natural grain and characteristic of the wood is to be preserved, varnish is used for the same purpose.

PLAIN-SURFACE PAINTING

COMPOSITION OF PAINTS

2. All paint is composed of two general ingredients; namely, the *pigment* and the *fluid medium*. The former usually consists of a mineral oxide or precipitated vegetable dye, which forms the body of the paint and determines its color, while the latter consists of the oil, varnish, water, or other fluid in which the pigment is dissolved or suspended, according to the character of which the paint is termed *oil color* or *water color*.

Oil colors are used in all places where the purpose of the paint is to protect as well as to decorate the surface to which it is applied, or where the painted decorations are likely to be exposed to the elements. Water colors are used exclusively for decorative effects, and then only in places where they will not be subjected to dampness or strong sunlight.

PIGMENTS

3. Various salts of lead produce white, red, and yellow pigments, the most important of which are the whites. Iron and mercury produce red pigments. The oxides of cobalt furnish a valuable shade of blue, and copper forms the base of a number of the most important greens.

The *ochers*, *umbers*, *siennas*, etc. are forms of earth, found in their natural state, already mixed with certain mineral oxides, which impart to them the colors by which they are known.

Lakes is the general term given to pigments that are derived from animal, vegetable, or coal-tar coloring matter. They are usually prefixed by another name so as to define

them more clearly, as *crimson lake*, *madder lake*, etc., madder being the name of that group of pigments made from the coloring matter of the madder root.

Carmines are pigments manufactured from coloring matter derived from cochineal, and they form several valuable combinations with madders and lakes.

WHITE PIGMENTS

4. White Lead.—The pigment known as **white lead** is composed almost wholly of carbonate of lead, and is produced by several methods. White lead is sold ground in oil—reduced to a thick paste, much too thick for use, and requiring dilution with oil and turpentine to bring it to a proper consistency.

The heaviest and whitest oxides of lead are the best, being, in point of color and body, superior to all other whites. When pure and properly applied in oil and varnishes, they are safe and durable, and dry well; but excess of oil discolors them, and in water painting, they are very changeable, sometimes becoming almost black. They have a destructive effect on all vegetable lakes, except the madder carmines, and are also injurious to minium, the red and orange oxide of lead; to orpiment, or king's yellow, which is a trisulphide of arsenic; to massicot, the yellow oxide of lead; to patent yellow, a chloride of lead; and to gamboge, a pigment derived from a powdered yellow gum. But with ultramarine blue, vermilion, yellow, and orange chrome, all of which will be described later, and with the lakes, ochers, and siennas, these whites compound with little or no injury.

5. In oil painting, white lead is essential in the ground for dead coloring or for the formation of tints of any color. White lead, when neutralized with black, is the best local white.

Lead pigments should not be employed in water colors, distemper, or fresco painting, because, with all such, they

occasion change of color, either by becoming dark themselves or by causing the colors with which they might be mixed, to fade.

White lead improves with age, but if exposed to the air, it will turn gray. White lead of good quality that has been allowed to age will go further and last longer than fresh white lead of the same quality. Paint made with fresh lead has a tendency to become yellow. Fresh white lead often has a yellowish tinge, which is due to the presence of iron.

6. White-Lead Adulterants.—White lead may be obtained either pure or adulterated with various substances, such as sulphate of baryta, sulphate of lead, sulphate of lime, whiting, chalk, zinc white, etc. These substances do not combine well, nor do they protect the surfaces to which they are applied.

Sulphate of baryta, the most common adulterant, is a dense, heavy, white substance, very much like white lead in appearance. Absorbing very little oil, it may be easily detected by the gritty feeling it produces when the paint is rubbed between the finger and the thumb.

7. Zinc White.—Hydrated zinc carbonate or oxide used as a pigment is called **zinc white.** This pigment is perfectly durable in oil and water, but, unfortunately, it is wanting in body. This renders it less useful to the house painter, who is more restricted as to the thickness and number of coats he applies than is the artist, who, in this respect, enjoys greater latitude. In house painting, therefore, the use of zinc white is resorted to only when extreme delicacy of treatment is demanded.

BLACK PIGMENTS

8. Lampblack.—The black pigment known as **lampblack** is simply the soot obtained by burning resinous woods, tallow, coal tar, etc. It is a purely carbonaceous substance of fine texture and is very durable. Lampblack may be experimentally prepared by holding a plate over the

flame of a candle and collecting the soot that deposits on the plate. On a larger scale, it may be obtained by suspending a conical metal funnel over a lamp flame that is fed with oil, tallow, coal tar, or crude naphtha through a large, bushy wick arranged to generate as much smoke as possible. Large, spongy, mushroom-like accumulations of exceedingly fine and very black carbonaceous matter gradually form at the apex of the cone, and this may be collected from time to time until a sufficient quantity is obtained. In this state the lampblack is very oily and can be used only as an oil pigment, but if slowly calcined in closed vessels, it is rendered drier and less oily, becoming what is known as **burnt lampblack,** which may be used as a pigment for both oil and water colors.

9. Ivory Black and Bone Black.—The pigments **ivory black** and **bone black,** though prepared by the same process, differ materially in their qualities. Each is prepared by charring to blackness, in a closed vessel, the material that forms its base. Though both are perfectly neutral and durable blacks, mixing well with oil, the former is superior in quality and may be mixed with certain proportions of white lead to form a beautiful pearl gray.

Black, furnished from calcined bones, however, has a peculiar reddish tint that mars it for some purposes. It tends, unless well burnt, toward a brown color, drying slowly and unevenly. Bone black is cheaper than ivory black, and is therefore frequently used where the latter would be more suitable and yield better results.

10. Frankfort Black.—The name **Frankfort black** is given to a pigment prepared from the lees, or sediment of wine, vine twigs, and tendrils—from which the tartar has been washed—by burning in the same manner as ivory black. Similar blacks are also prepared from peach stones, etc., though these are usually distinguished under the names of *almond black*, *peach black*, etc., and, in India, the shell of the coconut is employed for the same purpose.

Fine Frankfort black, used very largely by copperplate printers, is one of the most valuable black pigments obtainable, being of a fine neutral color, next in intensity to lampblack, and even stronger in effect than ivory black. Strong light has the effect of deepening its color, and it is probable that the grays so admired in the works of the Flemish painters owe their pureness to the use of this pigment in the mixture of their colors.

An inferior quality of Frankfort black is made from the levigated charcoal of woods, of which the hardest, such as box and ebony, afford the best material. This quality is extensively used as the pigment for printer's ink, but is also occasionally used as a paint.

11. Charcoal, or Blue, Black.—The pigment called **charcoal,** or **blue, black** is a well-burned and levigated charcoal of a cool neutral color, not differing in other respects from the common Frankfort black. Blue black was formerly much employed in painting, and, in common with all carbonaceous blacks, has, when duly mixed with white, a preserving influence on that color. This influence is due, chemically, to the bleaching power of carbon, and, chromatically, to the neutralizing and contrasting power of black with white. A superior blue black may be made by calcining Prussian blue in a closed crucible, in the manner of ivory black, and it has the important property of drying well in oil. Innumerable black pigments may, in this way, be made by charring.

BLUE PIGMENTS

12. Prussian Blue.—The coloring matter known as **Prussian blue** is made by mixing the yellow prussiate of potash with some salt of iron. This pigment dries well with oil and is much used for mixing dark blues, for making purples, and for intensifying blacks. Slight differences in the manufacture give considerable variation in tint and color, which causes the material to be known under various names, such as *Antwerp blue*, *Berlin blue*, *Chinese blue*, etc.

13. Indigo Blue.—The pigment called **indigo blue** is manufactured in the East and West Indies from several plants, but principally from the anil or the Indigofera. It is of various qualities, and has been known and used for many centuries in dyeing processes. In painting, it is not so bright as Prussian blue, but it is extremely powerful and transparent, and may be substituted for some of the uses of Prussian blue, as the latter is for indigo.

Indigo blue is of great body, and glazes and works well both in oil and water. Its relative permanence as a dye, however, has obtained for it a false character of extreme durability in painting, a quality in which it is very inferior, even to Prussian blue.

14. Ultramarine Blue.—The pigment **ultramarine blue** is obtained from the precious blue stone known as *lapis lazuli*, but its costliness places it outside the colors commonly used in house painting. Its beautiful shade, however, causes its name to be applied to several imitation, or artificial, ultramarines, of which the French and German are the most satisfactory.

15. Brunswick, or Celestial, Blue.—Another blue pigment is made by precipitating the alumina from a solution of alum with carbonate of soda, washing the precipitate, and adding sulphate of baryta, sulphate of iron, yellow prussiate of potash, and some bichromate of potash. When dried, this mixture is known as **Brunswick,** or **celestial, blue,** but when the sulphate of baryta is left out, and the material not dried, it is called *damp blue.*

16. Cobalt Blue.—The name now appropriated to the modern improved blue pigment prepared with metallic cobalt or its oxides is **cobalt blue.** The finest cobalt blue may not improperly be called a blue lake, the color of which, like enamel blues, is brought out by fire. When well prepared, cobalt blue is of a pure blue color, superior to all other blue pigments. It resists the action of strong light and acids, but its beauty declines in time under the influence of impure air.

YELLOW PIGMENTS

17. Naples Yellow.—The pigment known as **Naples yellow** is composed of the salts of lead and antimony, owing its name to the fact that it is supposed to have been first obtained from a volcanic product of Mount Vesuvius, near Naples. It is a very opaque pigment and therefore covers thoroughly the surface to which it is applied, but is not so brilliant as chrome yellow and is very difficult to grind.

18. Chrome Yellow.—One of the most durable of pigments is **chrome yellow,** which is obtained from the subchromate of lead. It is frequently adulterated with gypsum.

19. King's Yellow.—The name of a very dangerous and unsatisfactory pigment obtained from arsenic is **King's yellow.** This pigment is not very poisonous, but it is injurious to other colors when mixed with them. Least durable of all the yellow pigments, it is known, also, under the names of *yellow orpiment* and *Chinese yellow.*

20. Yellow Ocher.—The pigment called **yellow ocher** is a natural clay, colored by oxide of iron, that is found abundantly in many parts of England. It varies in tint from yellow to brown.

21. Yellow Lake.—There are several pigments that may be classified as **yellow lake.** These vary in color and appearance, according to the coloring substances and the modes of preparation used. Their colors are ordinarily bright yellow, very transparent, and not liable to change in an impure atmosphere—qualities of undoubted value.

RED PIGMENTS

22. Vermilion.—Among the red pigments, that known as **vermilion** is a sulphuret of mercury, which, previous to its being levigated, is called *cinnabar.* It is an ancient pigment, found both in a native state and produced artificially.

The Chinese possess a native cinnabar so pure as to require grinding only to become very perfect vermilion. The Chinese are also supposed to have a secret process of manufacture, whereby superior brilliancy is imparted to the color and the beauty of the natural pigment enhanced.

23. Red Lead.—The very old pigment **red lead** was formerly known as *minium* or *saturnine red*, and was confounded by some old writers with cinnabar. It is a deutoxide of lead, prepared by subjecting massicot to the heat of a furnace having an expanded surface and free accession of air. It is of scarlet color and fine hue, warmer than common vermilion, bright, but not so vivid as the biodide of mercury though having the body and opacity of both pigments. When pure, red lead is unaffected by light, but acids, white lead, or any oxide, or preparation of the metal, soon deprive it of color, while impure air will blacken and ultimately metallize it. Red lead is often adulterated with brick dust, the presence of which may be detected by heating the red lead in an iron crucible and treating with nitric acid diluted. This will cause the red lead to dissolve, while the brick dust will remain.

24. Light Red.—In reality, **light red** is a burnt ocher of russet-orange hue, being principally valued for its tints when mixed with other pigments. The *crimson light red* is a brown ocher burned. The principal yellow ochers afford this color best; the brighter and better the ocher from which this pigment is prepared, the brighter will be the red, and the better the flesh tints it will afford with white. It is used to a great extent in figure and landscape painting.

25. Venetian Red.—True **Venetian red** is believed to be a native ocher, but the various pigments sold under this name are prepared from sulphate of iron.

26. Indian Red.—The pigment known as **Indian red** is a ground ore hematite or peroxide of iron, brought, as its name indicates, from Bengal, India, but it may be artificially prepared by calcining sulphate of iron. Its tints vary

greatly, but the best are those of a rosy hue. This pigment, an anomalous red of a purple-russet hue, has good body and is valued, when fine, for the pure lake-like tone of its tint. Defying the effects of time or fire, it remains an opaque color, covering its surface satisfactorily. Indian red is sometimes called *Persian red.*

27. Lakes.—The name **lake,** given to a series of red and other colored pigments, is derived from the East Indian term *lac*, or *lacca*, the material from which lakes were originally made. Lakes are now usually prepared by precipitating colored tinctures of dyes on alumina and other earths, etc. The lakes are therefore a class of pigments, numerous both with respect to variety of appellation and diversity of substance entering into their preparation. The coloring matter of common lake, also known as *drop lake*, is brazil wood, affording a very fugitive and unreliable color. Superior red lakes are prepared from lac, cochineal, and kermes, but the best from the root of *Rubia tinctorum*, or madder plant.

28. Scarlet Lake.—The pigment **scarlet lake** is one of a numerous lot of lakes made from cochineal, others being *Florentine lake*, *Hamburg lake*, *Chinese lake*, *Roman lake*, and *carminated lake.*

Cochineal is of a deep-red color, which, when treated with acids, becomes more or less of an orange tint, but if subjected to the influence of an alkali, turns to a violet color. Cochineal is the base of many red pigments noted strictly for their glazing qualities.

29. Carmine.—The pigment **carmine** is obtained from kermes, the *Coccus ilicis*, found on certain oaks of the Mediterranean. Although not generally used in house painting, carmine is undoubtedly the finest red known.

30. Rose Pink.—A coarse kind of lake, called **rose pink,** is produced by dyeing chalk or whiting with a decoction of brazil wood. It fades quickly, and is chiefly used for paper hangings, etc. *Dutch pink* is a similar substance, made from quercitron bark.

GREEN PIGMENTS

31. Chrome Greens.—The coloring materials classified as **chrome greens** are compound pigments, of which chrome yellow is the principal coloring substance. The coloring matter of true chrome, or native, green, being the pure oxide of chromium, free from lead, makes this pigment enduring against the action of sunlight and of impure air. Of various degrees of transparency and opacity, and of several hues, it affords pure, natural, and durable tints. True chrome greens neither inflict on nor receive injury from other pigments, and are eligible for either water or oil painting. In the latter case, they dry well as a rule. They likewise afford valuable colors in enamel painting.

32. Brunswick Green.—The coloring material called **Brunswick green** is one of a large class of pigments grouped under the name of *copper greens.*

The copper greens include verdigris, verdite, malachite, mineral green, Schweinfurt, or Vienna, green, green bice, Scheele's green, emerald green, green lake, mountain green, African green, French green, marine green, Olympian green, etc., some of which call for special mention.

33. Verdigris.—There are two kinds of **verdigris;** namely, *common* or *impure*, and *crystallized* or, more properly, *refined.* Both are acetates of copper of bright color, inclining to blue, and are the least permanent of the copper greens, soon fading and becoming white by the action of light, particularly in water colors, and ultimately, through dampness and foul air, turning black.

34. Emerald Green.—The name **emerald green** is applied to a copper green of an earthy hue. The most vivid of this class of colors being rather opaque and powerfully reflective of light, it appears to be the most durable pigment of its class. Not common in nature, its hue is well suited for brilliant works. The only true emerald green is that of chromium with which nature gives the green color to the emerald. For purposes of commerce, emerald green is made

of verdigris mixed with a solution of arsenious acid. It is brilliant in color, very poisonous, and difficult to grind.

35. Scheele's Green.—The coloring substance known as **Scheele's green** is a compound oxide of copper and arsenic, being named after the justly celebrated chemist that discovered it. Scheele's green is of a beautiful, light, warm green color, opaque, permanent in itself and in tint; when mixed with white lead, however, it is to be cautiously used with Naples yellow, which soon destroys it. *Schweinfurt green* and *Vienna green* are the names of pigments similar to that just given. Less affected by damp and impure air, these pigments are more eligible than simple copper greens. All these greens, however, are very poisonous.

SEMINEUTRAL COLORS

36. Umber.—The name **umber** is given to a brown pigment that is obtained through the agency of oxide of iron, from naturally colored clays. Some of these come from Turkey, and some from Umbria, Italy, from which place this pigment receives its name. In its natural state, umber is usually designated as *raw umber*, while *burnt umber*, a pigment of darker color than the preceding, is obtained by calcining raw umber at a low temperature.

37. Vandyke Brown.—The pigment known as **Vandyke brown**, hardly less celebrated than the great painter whose name it bears, is a species of bog earth of a fine, deep, semitransparent brown color. This pigment, much used and esteemed by Van Dyck, came, it is said, from Cassel, a town in Prussia. The Vandyke browns in use at present appear to be terrene pigments of a like kind, which are purified by grinding and washing.

38. Raw Sienna.—The pigment called **raw sienna** appears to be an iron ore and is considered as a crude natural yellow lake.

39. Sepia.—The brown pigment **sepia** was originally obtained from the excrescence of the cuttlefish, sometimes called the inkfish, on account of its affording this dark liquid, which was used by the ancients both as an ink and as a pigment. Sepia is of a powerful, dusky brown color and a fine texture, works admirably in water, combines readily with other pigments, and proves very permanent in results. It is used mainly as a water color on account of its reluctance to dry in oils.

40. Asphalt, or Mastic.—The fireproof and waterproof pigment known as **asphalt,** or **mastic,** is obtained in natural formations, such as the great asphalt lake in Trinidad. Used more as a varnish than as a paint, it is, when mixed for use, dissolved with resin in tar oil in the proportion of about ½ pound each of asphalt and resin to 2 pounds of oil. It is then kept hot until the dissolution is complete.

CLASSIFICATION OF PIGMENTS ACCORDING TO USES AND CHARACTERISTICS

41. These various pigments may, according to uses and characteristics, be classified as follows:

1. Those more or less transparent and fit for graining and finishing are: all blacks (except mineral blacks), umbers, chrome greens, cadmium yellow, raw and burnt sienna, ocher, French ultramarine, Mars orange, and brown sepia.

2. Those little, if at all, affected by heat or fire are: the whites and the ochers, in natural clays.

3. Those for fresco or distemper work are: the whites made from sulphate of baryta or carbonate or sulphate of lime, all the ochers, the reds, blues, browns, and blacks.

4. Those more or less injured by damp and impure air, and unfit to use in distemper are: white lead, all the yellows, except the ochers, red lead, Prussian and cobalt blues, orange salts of lead, and all the greens.

5. Those which fade or are affected by strong light are: all vegetable colors, including the yellows, Prussian blue, indigo, and, in less degree, the madders.

OILS AND DRIERS

CHARACTER AND PURPOSES OF OILS

42. Oil is one of the fluid mediums in which a pigment is suspended to enable the painter to spread it properly and cause it to adhere when dry. The oil is termed the *vehicle*, because it serves to carry the pigment evenly over the surface to which it is applied. The vehicle is usually combined with some other medium, or subjected to some special preparation, to give it the drying qualities it seldom in itself possesses. The medium so added is called a *drier*, as will be explained hereafter, and is varied in material and quantity, according to the character of the oil with which it is mixed.

LINSEED OIL

43. Raw linseed oil, which is the oil most generally used by the house painter, is obtained by the compression of flaxseed. This oil varies greatly in quality, as well with reference to the seed from which it is extracted as in respect of age and consequent clearness. When a large quantity is kept stored for six months or more, refuse forms at the bottom of the vessel in which it is kept, and this refuse cannot be used, save in mixing coarse paint for outside work.

Linseed oil is, from its cheapness, the only oil in common use for house painting, and it may under proper management be made to answer for every kind of work. The marked defects in linseed oil are its brown color and its slowness in drying. These defects may, however, be greatly diminished, if not entirely removed, by allowing the oil to stand for a length of time before using it. It then becomes a good vehicle for color without any mixture. Nevertheless, linseed oil is generally used with a proper drier, and it never by itself becomes sufficiently pure to use with white or other light tints owing to the brown color it imparts. Raw linseed oil may be made to dry more rapidly by adding about

1 pound of white lead to every gallon of oil, and allowing it to settle for at least one week. Not only is the color of the oil thus improved, but the lead may afterwards be used for ordinary work.

One method of purifying linseed oil is to place the oil in a bottle or jar and then drop into it some powdered whiting. The mixture should then be stirred or shaken, and afterwards allowed to stand for a time in a warm oven. The whiting will very soon carry down all color and impurity and form a precipitate at the bottom. The refined oil at the top may then be drawn off. In the rare instances, where the least yellowness in the oil might prove injurious, either nut or poppy oil may be used with advantage, but for general purposes, linseed oil is to be preferred.

44. Boiled linseed oil, commonly called **boiled oil,** is prepared by heating raw oil with certain driers. The drying qualities of the raw oil are greatly improved by the mere process of boiling, but when certain substances are added, this improvement is greatly enhanced.

Pale drying oil may be made by mixing 1 gallon of linseed oil with about 7 pounds of either litharge or sugar of lead, and then raising the mixture to a moderate temperature.

Drying oil for common work may be made by boiling 1½ pounds of red lead in a gallon of raw linseed oil and then allowing the mixture to settle.

NUT AND POPPY OIL

45. Nut Oil.—Another oil in common use is **nut oil.** This oil, which is almost colorless and transparent, is expressed from the English walnut. It dries more rapidly than linseed oil, and, owing to its lack of color, it is used for white and other light paints. Its cheapness also commends it for the commoner grades of work.

46. Poppy Oil.—An oil that stands second to linseed oil for strength and durability is known as **poppy oil.** This

oil is colorless, and in some instances, where the time required for drying is not limited, it is used for delicate work. Poppy oil is, in some old books, spoken of as *oil of pinks* and *oil of carnations.*

TURPENTINE

47. Turpentine is the oleoresin exuding from any one of several coniferous trees; also the semifluid resin of the terebinth, or turpentine, tree—*Pistácia Terebinthus.*

48. Oil of turpentine is obtained by distilling with water, in an ordinary copper still, turpentine previously melted and strained. The distilled product is colorless, limpid, and very fluid, and has a very peculiar odor. The rectified oil, improperly called *spirits of turpentine*, is preferable on account of being thinner and more free from resin. When colored by heat or in some other manner, oil of turpentine may be bleached by stirring some lime powder in it. The ordinary use of this oil is to thin oil paints, to flatten white and other colors, or to remove superfluous color in graining. However, it prevents paint from bearing out, and when used alone, will not fix the paint on the surface to which it is applied.

DRIERS

49. A drier is a substance that is added to paint in order to cause the oil to thicken and solidify more rapidly. The drying of linseed oil is caused by the absorption of oxygen, and there is little doubt that driers usually act simply as carriers of oxygen to the oil, a very small quantity yielding quite extensive results. The best driers, therefore, are those containing a large proportion of oxygen, such as litharge, acetate of lead, red lead, sulphate of zinc, verdigris, etc., which, when added to the oils, improve their drying qualities by causing the more rapid absorption of oxygen. These driers are ground up in oil and mixed in small quantities with the suspended pigment. Some colors will not dry

without driers, but remain tacky, and thereby exposed to much injury, through the accumulation of dust and the degeneration of the tints.

50. Following is a list of driers, each of which is suited to some particular quality or color of paint:

Red lead makes a good, cheap drier, but can, of course, be used only in situations or in paints where its color is unobjectionable.

Sugar of lead (acetate of lead) when ground in oil is the best but most expensive of all driers, and, like copperas (sulphate of iron) and white vitriol (sulphate of zinc) it is used as a drier for light tints especially.

Litharge (oxide of lead), the drier most commonly used, is produced in the oxidation of lead containing silver. It can be procured on a small scale by scraping off the dross that forms on molten lead when exposed to a current of air.

Massicot is a superior kind of litharge produced by heating lead to a degree insufficient to fuse the oxide.

Oxide of manganese, though not so rapid as litharge or massicot, is quick in effect; but, being of a very dark shade, is seldom used except for the deep colors.

Sulphate of manganese is the best drier for zinc white, only 6 or 8 ounces being needed for 1 hundredweight of ground zinc paint. The manganese should first be mixed with a small quantity of the paint, and then added to the bulk. If great care is not taken in mixing the drier, the work will be spotted.

Japanner's gold size (acetate of copper) is for some uses an excellent drier, but care must be taken in mixing, because too much will make the paint brittle and cause it to crack.

Patent driers containing oxidizing agents, such as acetate of lead, litharge, etc., are ground and mixed in oil, ready for immediate use. Some of the inferior kinds that depend for their drying qualities on lime should be avoided.

Terebene is a powerful drier. It is used as a substitute for patent driers, and when mixed in the proportion of 1 ounce of terebene to 1 pound of paint, it will dry in about half an hour.

Xerotine siccative is a species of terebene, but differs from it, in that, when mixed with oil, the mixture does not become cloudy.

When using the preceding driers, care should be taken: (1) not to use them unnecessarily with pigments that dry well in oil color; (2) not to employ them in excess, which not only retards the drying, but injures, if it does not destroy, the paint; (3) not to add them to the color until ready for use; and (4) not to use more than one kind of drier in the same lot of paint.

VARNISHES

51. Varnish is a solution of gum or resin in alcohol, turpentine, linseed oil, or the like, and is applied to produce a hard, shining, transparent coat on a surface. The oil dries, but the alcohol and turpentine evaporate, leaving the fine transparent film of resin over the surface that is varnished.

To estimate the quantity of a varnish, the following points should be considered: (1) Quickness in drying; (2) hardness of film, or coating; (3) toughness of film; (4) amount of gloss; (5) permanence of gloss; and (6) durability on exposure to weather.

The value of a varnish depends almost entirely on that of its constituents, but much care and skill are demanded in mixing and boiling the ingredients. Varnish is used to give brilliancy to painted surfaces and to protect them from the action of the atmosphere or from any slight friction. Varnish is often applied to plain, unpainted wood surfaces in roofs, joinery, and fittings of houses, to intensify and brighten the ornamental appearance of the grain; it is also applied to painted and papered walls. In the former case, it is sometimes flatted so as to give a dead appearance, similar to that of a flatted coat of paint.

In general appearance and characteristics, the resins from which varnishes are usually made are very much the same. These resins differ in name, however, according to the tree or shrub from which they are gathered, and, in most cases, these growths give their names to the varnish into which they

enter. For example, copal varnish is made of copal gum; dammar varnish of dammar gum; etc.

In the application of the various varnishes, it will be well to remember that all are more or less interchangeable for all purposes, the specific applications being governed as well by the quality of work required as by the cost of the varnish.

52. Copal Varnish.—Copal gum, balsam copaiba, previously warmed, and oil of turpentine are used in making **copal varnishes.** Soft resins are sometimes substituted for mastic, and inferior hard resins also employed in place of copal, in the composition of these varnishes. Copal is of difficult solution in turpentine and linseed oil, both of which enter into the composition of the ordinary copal varnishes employed by the coach painter, affording the best varnishes used by the house painter and grainer. Combined with linseed oil and oil of turpentine, copal varnish affords a vehicle superior in texture, strength, and durability to mastic or magilp, though in application it is a less attractive instrument and is more difficult of management.

As copal swells while dissolving, its solutions and varnishes contract and consequently split in drying, making unsightly fissures, against which linseed oil is the essential preventive. The mixture of copal varnish and linseed oil is best effected through the medium of oil of turpentine, heat being sometimes requisite for this purpose.

53. White Copal Varnish.—The varnish known as **white copal varnish** is prepared by dissolving copal and camphor in white drying oil and essential oil of turpentine.

Where a fine, durable finish is required similar to that of a piano case, it is necessary to apply several coats of varnish, rubbing down with powdered pumice and water or oil, after each coat is dry. For this purpose, an exceedingly hard and durable varnish is required and the best copal varnish is usually specified.

54. Mastic Varnish.—*Gum mastic* affords a base for a varnish nearly as hard as copal varnish, but better adapted

to certain classes of work, where subsequent rubbing is not required. This varnish, known as **mastic varnish,** is particularly useful to the artist in varnishing pictures, and is also used for the same purpose by the fresco painter when executing works in oils.

55. Magilp.—The term **magilp** is applied to the composition resulting from a mixture of equal portions of turpentine and pale dry oil, of linseed drying oil and mastic varnish, of simple linseed oil and sugar of lead, or of boiled oil, mastic varnish, and sugar of lead combined. These ingredients gelatinize when mixed with oil colors and give them a certain amount of body and pulpy transparency.

56. White Lac Varnish.—The solution known as **white lac varnish** is prepared by dissolving in alcohol or spirits of wine lac resin of India that has been chemically deprived of all coloring matter and purified from gluten, wax, and other extraneous substances with which it is naturally combined. The varnish that lac resin of India affords without this purifying process is opaque and dark in color, like the japans and lacquers of the East; but when this resin is purified as just mentioned, the varnish is brilliantly transparent, very hard, and nearly colorless. This being a spirit varnish, it requires a warm temperature, which is helpful, indeed, to all varnishes, and enjoys the valuable distinction of drying rapidly.

White lac varnish being somewhat costly, its place is often filled, in ordinary work, by the common *white shellac varnish*, which consists of the softer resins dissolved in alcohol with shellac.

57. Lacquers.—The varnishes known as **spirit varnishes,** or **lacquers,** are made with softer gums, such as lac and sandarac, dissolved in alcohol. These varnishes dry more rapidly and become harder and more brilliant than turpentine varnishes, but being liable to split and scale off, they are used for cabinetwork and other work not exposed to the weather.

STAINS

WOOD STAINING

58. Stains are liquid preparations of different tints that are applied to carefully prepared surfaces of the cheaper woods, such as poplar, pine, etc., in order to give these woods the appearance of the more rare and expensive kinds, such as rosewood, mahogany, walnut, etc. The process of staining consists, in the main, of laying on the stains in the form of mere washes, so as to change the shade of one wood to the shade of another that, in its natural grain, it resembles. The stain is applied with a sponge or a large brush, the wood having been previously well rubbed with glass paper and the dust resulting carefully removed. The stain should be applied sparingly and well rubbed in, the desired depth of color being obtained by several washes rather than by a dark and heavy one. In the case of hardwoods, the tinting colors should be added to the filler before staining.

CREOSOTE STAINS

59. Creosote is the basis of several valuable preparations for preventing rot in wood, and is, in the form of stains, assuming importance in the builder's art as a substitute for paint. The softer kinds of wood, unless thoroughly seasoned, contain considerable sap, which, if not in some way expelled or neutralized, causes rapid decay. In the application of creosote to the wood, which is usually done by dipping or with a brush, the creosote is quickly absorbed into the pores; it thus counteracts the chemical changes in the sap and thereby indefinitely insures the durability of the wood. Creosote also prevents dry rot, as well as the ravages of wood-boring insects. The valuable qualities of creosote as a preservative of railroad ties, and timber under water, have long been recognized. The great advantage of creosote over paint is that the former, while

entering closely into the structure of the wood, permits the evaporation of any moisture. Paint, on the contrary, has no preservative qualities in itself, merely forming a coating impervious to air and water, so that if the wood has not been completely seasoned before painting, the imprisoned moisture will in time produce decay.

Creosote stains are now much used instead of paint on parts of buildings much subjected to moisture, especially shingles and sidings. The cheapness of such stains, both in material and cost of application, is a factor of considerable importance. The cost of even the very best qualities does not exceed probably one-half that of paint, and as any person can do the work quite rapidly and with good effect, the labor of applying it is also much less than that involved in the process of painting. The saving in time is due to the thin character of the stain, which dries quickly and consequently permits the completion of more work in a given time than painting can allow.

60. From an artistic point of view, the superiority of creosote stains over paint is apparent, even to superficial observers. Paint is a liquid veneer completely covering the wood and replacing the grainy surface with its own glossy monotony. It is proper to paint all smooth-planed wood in which utility and not artistic effect is of first importance. But when regard is had for artistic effect, paint, let it be noted, gives crude results, entirely masking the grain of the wood—one of the chief beauties of shingled roofs and side walls. Paint gradually becomes oxidized, and growing darker with age, splits and scales off, presenting a shabby and unpleasant appearance. To obviate this result, even the best paint must be renewed every three or four years, while many of the cheaper paints will hardly last two years without freshening.

Creosote stains are transparent, and instead of hiding the grain of the wood, they render it more prominent. For example, on a roof, the surface texture of each shingle is different, and each, if creosoted, retains this characteristic;

but, if the shingles are painted, the roof loses this characteristic entirely. As creosote stains enter into the structure of wood, they cannot split nor peel, and as the color gradually disappears—all colors will fade in strong sunlight—it becomes softer and more delicate in tone, producing the antique effect so greatly admired.

61. One of the principal virtues of creosote stains is that they never turn black—a conspicuous fault of other stains and many paints. Work so treated can therefore be perfectly renewed with one coat of stain—an impossibility with a stain that turns black. The color effects of creosote stains are soft, warm, and rich, harmonizing perfectly with nature's tints, and these effects seem to improve with age rather than deteriorate. Stains are as durable as the best paint—far more, indeed, than the inferior kinds—and when properly applied to dry wood, they are quite as efficient as paint in preserving qualities.

Creosote diminishes the inflammability of wood while paint in some cases tends to augment it. For use over weather-worn paint, the darker, heavier stains are to be preferred, yielding, in this respect, satisfactory results. In fact, light stains should not be applied over a dark paint. For newly painted work, the use of stains cannot be recommended, because, where the wood is so covered, its absorbent quality is lost and a stain effect is then impossible.

Paint may, however, be laid as well over a creosote stain as if applied to new wood. For this reason, a stain makes an admirable primer of smooth surfaces on which paint is to be subsequently laid, as it fills the wood and has preserving properties not to be found in common primers. Paint used over a creosote-stain priming coat will never mildew.

62. Clapboard sidings, as well as shingles, are susceptible of rich and delicate treatment with creosote stain, and at much less cost than painting involves. As a rough surface takes the stain better than a smooth one, sawed clapboards should be laid rough side out. When so treated, they show a deep, rich color effect almost equal to that of shingles.

Fences, sheds, and other outbuildings may be stained at from one-quarter to one-half the cost of painting; besides, they will be more effectually preserved from decay than if painted. The cheaper stains are very desirable for the insides of stables, coops, cattle sheds, etc., where the powerful antiseptic properties of creosote are of great value in destroying parasites and preventing disease.

When rainwater from roofs is collected in a cistern and used for domestic purposes, care should be taken, if creosote stain is used, to prepare the stain so that it will quickly dry after application. The reason for doing this is that creosote, while not injurious, is unpleasant to the taste; however, upon drying rapidly, it will, after the first few rains, leave no foreign taste in the water. In fact, whether paint or stain is used on a roof surface, the first two or three rains should not be collected for any purpose, because, in the case of paint, the superfluous color is washed off and contaminates the water, while with creosote, the taste of the water is affected.

To bricks that are off-color and in need of an even tone, any of the red stains may be applied successfully. Stains are extensively used for this purpose, and always with good results, the fact that they cannot crack or peel being of great importance. Whenever needed, one coat of the same color will usually renew the stains; two coats, however, will, if a change of color is required, effect the purpose. In restaining, a shade lighter than the result desired should be used, for the stains, being transparent, come out darker on old work than on new wood.

63. The stains may be purchased, ready for use, in any size package required, from a 1-gallon can to a 50-gallon barrel. They do not require thinning and may be applied either with a brush after the shingles are laid, or the latter may be dipped in the stain before being laid. The advantages of dipping are that the shingles are more fully impregnated with creosote and consequently more thoroughly preserved, and when, in the course of time, they shrink,

no untreated wood will show through the splits. Brush coating is, however, much the cheaper method. But even where the dipping method is used, it is advantageous to apply a brush coat after the shingles are laid, as it renders the color more permanent and yields a more uniform effect, covering raw edges where the shingles have been cut to fit corners, window frames, etc. In the brush treatment, two coats should always be applied, such work being far more lasting than if only a single coat is laid. In order to get a color effect that will be uniform and permanent, care should be taken, before using the stains, to see that they are so thoroughly stirred as to bring all the coloring matter into suspension. If the creosote is in a can, the stirring may be done through the opening in the top, but if in a barrel or a keg, the head must be removed and the stain stirred every time a pot or tubful is taken out.

In dipping shingles, it is an economical plan to fasten on the edge of the dipping tub, a brush on which to wipe each shingle as it is withdrawn. This saves stain and hastens the drying. The shingles should not be soaked, but simply dipped into the stain and then removed as quickly as possible and thrown in a loose pile, which a free circulation of air will speedily dry. One man can dip 7,000 shingles per day. One gallon will cover 150 square feet of surface with one, or 100 square feet of surface with two, coats. Dipping a thousand shingles requires from 2½ to 2¾ gallons, but the dipping and brushing of the same number of shingles demand 3 gallons. Only two-thirds of the length of the shingle need be dipped.

64. Creosote Bleaching Oil.—In order to produce a silver-gray effect on shingles **creosote bleaching oil** is used. This material, at the time of its application, colors the wood to a slight degree only; a few months' exposure to the weather, however, bleaches the surface of the shingles to the beautiful, silken, silver gray that is sometimes seen and admired on ancient seaside edifices. This charming color improves with age and never calls for renewal, while

the creosote preserves the wood, preventing mildew and the consequent blackening of the shingles. The creosote bleaching oil should be used on new work only. Its covering capacity is about one-fifth less than that of the ordinary stains.

REVIEW EXERCISES

1. Of what is the best white paint composed?
2. (*a*) Of what is ivory black composed? (*b*) Frankfort black? (*c*) Blue black?
3. Name four blue pigments and describe briefly their composition.
4. (*a*) Of what is yellow ocher composed? (*b*) Chrome yellow? (*c*) Naples yellow?
5. (*a*) What is Indian red? (*b*) Red lead?
6. Of what are the principal green pigments composed?
7. What pigments are most affected by (*a*) dampness? (*b*) Strong light?
8. (*a*) What is the principal oil used in house painting? (*b*) What is its chief defect? (*c*) How may this be overcome?
9. (*a*) What is a drier? (*b*) In what way does it serve its purpose?
10. (*a*) What is a varnish? (*b*) Give name and ingredients of a hard, durable varnish.
11. (*a*) What is creosote stain? (*b*) What is its chief value?

INTERIOR DECORATION

INTRODUCTION

65. Interior decoration consists of clothing the walls of the rooms in a building with some material, or treating them in some manner to render them pleasing to the eye and harmonious with the purpose of the apartment. While the scale and degree of magnificence of the building may materially affect the expense put into decorative work, there is no residence or other structure erected for sheltering man so unimportant that consideration of decorative effect need be neglected.

Decorations do not necessarily add to the expense, but simply require the application of elements in harmony with good taste and with the finish of the building. Paint is applied to interior woodwork primarily to protect it, and inasmuch as paint must be used, there is no reason why it should not be used with decorative effect, which can be obtained by the proper combination of colors. Walls are usually painted, frescoed, paneled in wood, or covered with some fabric, as paper, burlap, cloth, leather, or other material.

66. The work of the designer of interior decorations consists of three parts: (1) the preparation of the design as a pictorial suggestion; (2) the working up of the details and practical drawings after the pictorial suggestion has been accepted; and (3) the carrying out of the decorative scheme in the materials specified.

The materials adaptable to interior decorative schemes are unlimited. It is not improbable that every fabric that has ever been made has at one time or another been used as a wall covering. Many of these are unsuited to the purpose, but in the majority of cases the application has been a

success. The more common forms of treatment consist of wood paneling, tiling, marble work, and metal for inflexible materials, and paper, cloth, leather, etc. for a flexible finish. Marble and leather being particularly expensive for this purpose, an imitation of these is manufactured in paper (specimens of which will be referred to later on), but these imitations are limited in their application.

67. It should be borne in mind that no matter what material is used for decorative effect, it should show itself to be what it is, and not pretend to be anything else. If the character of a room does not warrant the expense of marble wainscots or mahogany paneling, then the decorative effect should be carried out in some simpler material, but not in imitation of what cannot be afforded.

In designs for scenery and stage settings, it is perfectly proper and in keeping that the whole substance be an imitation, as the temporary character of the structure demands economy of materials, while the play itself, being an imitation of real life, requires the appearance of realism.

Designs for interior decoration should therefore be considered in the actual material at all times, while the substitution of imitations should be resorted to only when, as just stated, the temporary character of the structure makes the imitations preferable to the real thing.

68. Interior decoration is not necessarily a branch of art separate and distinct from architecture. Beams are required to support floors, girders are introduced to carry the beams, and columns are necessary to uphold the girders. Therefore, these elements themselves may be made decorative in order to produce the desired effect. The introduction of the classic column or the pilaster at once suggests the idea of a pedestal or a dado to form a wainscot and an architrave to clothe the beam. The pilasters may be multiplied to form vertical elements for the subdivision of the wall space, and at once the wall surfaces become divided into a series of panels that in themselves present framed surfaces to receive individual decorative attention.

TREATMENT OF WALL SURFACES

SUBDIVISION

69. When the walls of an apartment are to be subdivided into panels or into bands the first consideration is that of *proportion*. There are no set rules governing such proportion, as it will vary with the circumstances of each case. Again, several treatments will find favor with different persons, and as *unity* and *variety* are the chief elements of beauty, the most satisfactory results will be attained only when a design presents the most pleasing variety with an expression of unity, and this will vary under different conditions.

70. Classic architectural treatment demands the subdivision of a building into three parts; namely, the basement, the superstructure, and the roof; and in the classic orders, this idea is carried out in the subdivision into the pedestal, the column, and the entablature. Again, the pedestal is subdivided into the base, the dado, and the cornice; the column into the base, the shaft, and the capital; and the entablature into the architrave, the frieze, and the cornice. Yet the proportions of these subdivisions are different in each case, as the purpose of each combination is different. Variety is attained by the variation of the several proportions, while unity is maintained by the systematic relations of the whole.

71. The walls of a room may be similarly divided into three parts—the *dado*, the *frieze*, and the *field*—but the proportion of one to another must depend entirely on the proportions of the walls themselves. With square walls, a satisfactory proportion is to make the dado one-third, and the frieze one-fifth, of the entire height, as shown in Fig. 1 (*a*); whereas, in a long, low wall the proportion of the frieze and dado should be less, as shown in (*b*). Where the dado is about one-fourth and the frieze about one-fifth, of the height

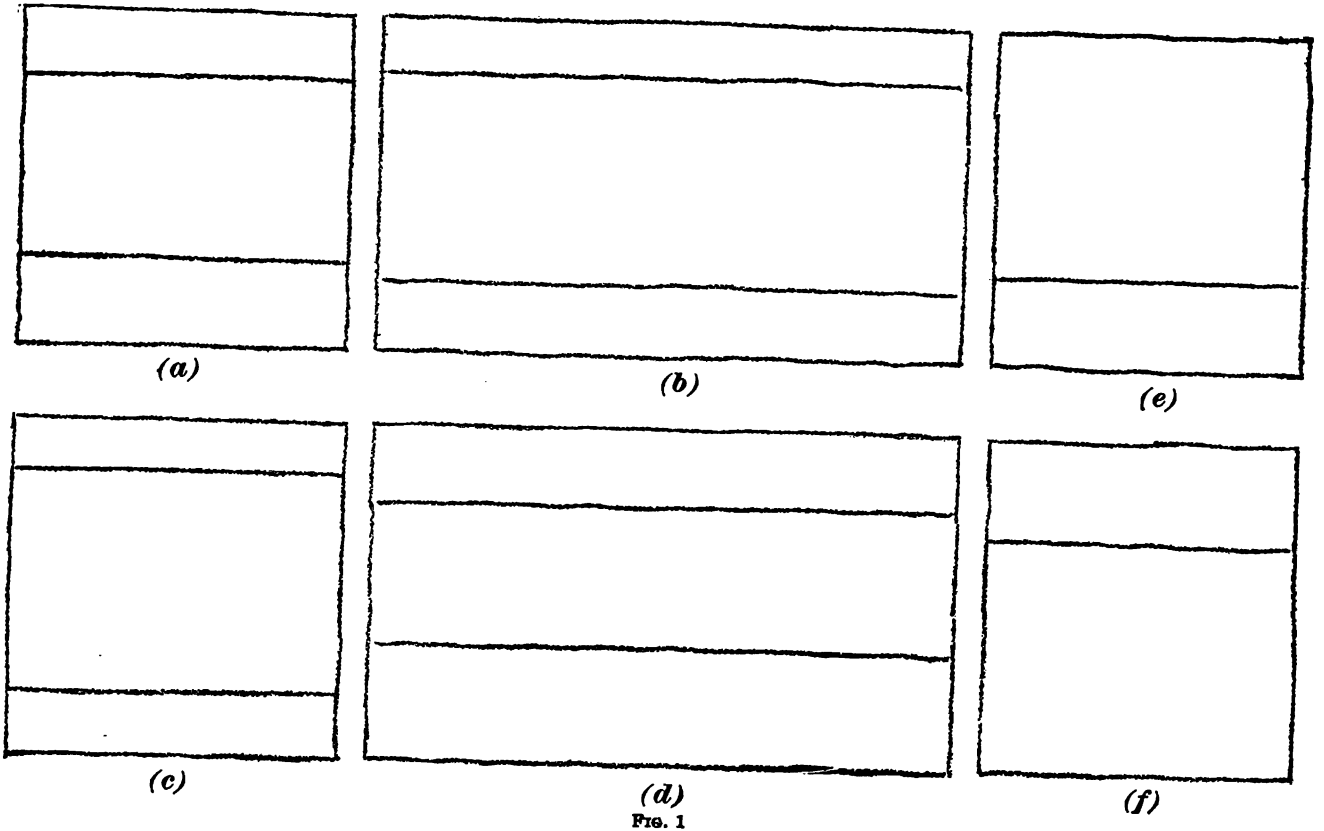


FIG. 1

of the entire wall, this being very near the proportion of pedestal, column, and entablature in the orders, the subdivision shown in (*a*) would not suit the surface (*b*), nor would the subdivision in (*b*) be as satisfactory for the surface (*a*), as shown in (*c*) and (*d*). Therefore, in a long, narrow room where both these conditions exist, a compromise would be necessary.

If the field space is to be decorated with wall painting or with tapestry, as in Fig. 2, it might be desirable to omit the frieze and simply divide the surface into two parts, as shown in Fig. 1 (*e*), which is the subdivision shown in Fig. 2 (*a*), or to increase the frieze and diminish the dado, as in Fig. 1 (*f*), which was done in Fig. 2 (*b*). The fresco decoration being the detail in which the interest centers, the remainder of the wall should be as simple and unobtrusive as possible.

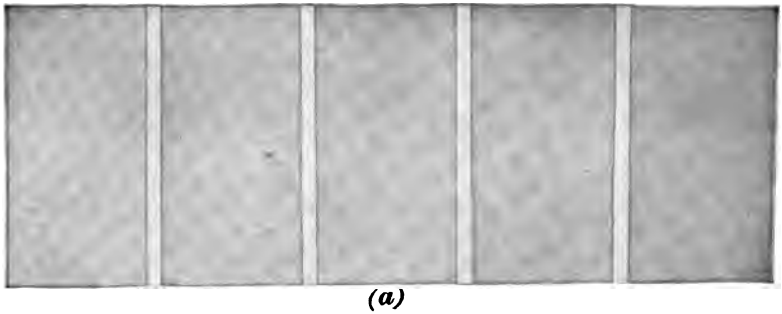
72. The character of the wall decoration, as well as the shape of the wall surface, will also affect the apparent proportions into which the wall may be subdivided. Vertical stripes will make a wall appear higher, while horizontal bands will cause it to appear lower than it really is. Where a wall is long, as in Fig. 1 (*b*), and also so low that a treatment in horizontal bands is likely to prove objectionable, vertical elements may be introduced to divide the surface into individual panels, as in Fig. 3 (*a*), each of which may then be treated as a separate wall. Another plan is to carry a frieze across the entire wall, so as to unite the design, and then divide the under portion into panels, as shown in Fig. 3 (*b*). A third method is to carry the frieze and the dado around the four sides of the room, and then subdivide the field into individual panels, as in (*c*) and (*d*).

While all these methods of treatment are particularly suitable to a long room, care must be taken that a proper effect of ceiling height is attained. Horizontal panels, as in Fig. 3 (*d*), are likely to cause the same depressed ceiling effect as the treatment shown in Fig 1 (*d*), so that the proportion of the panels must in each case be carefully studied.

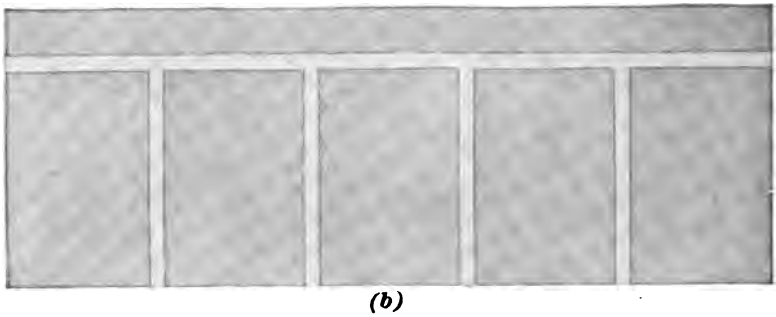
(a)

(b)

FIG. 2



(a)



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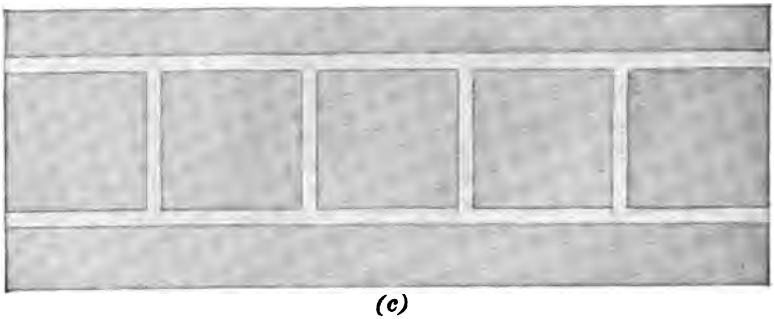

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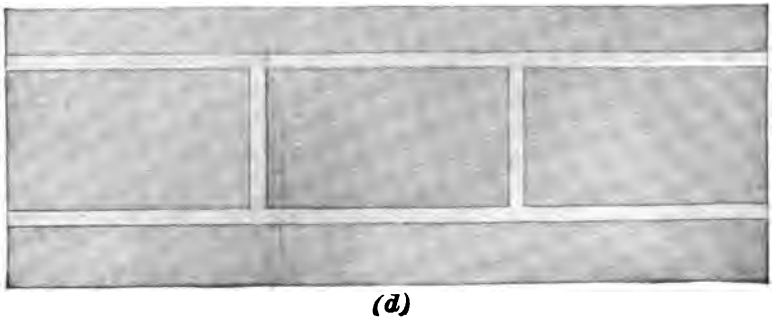
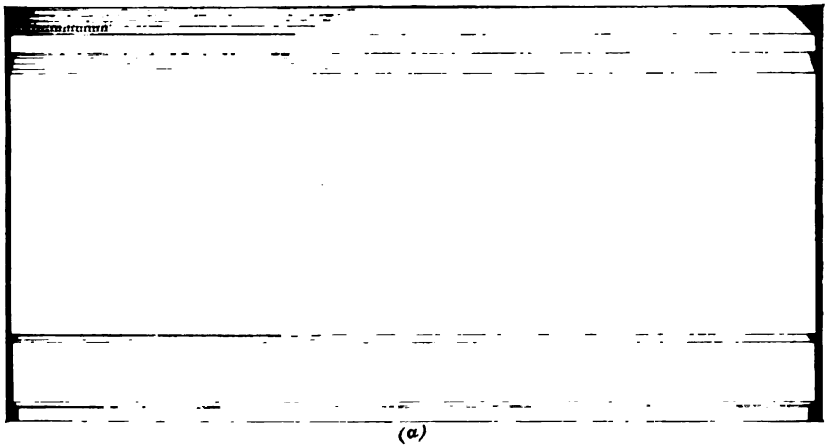


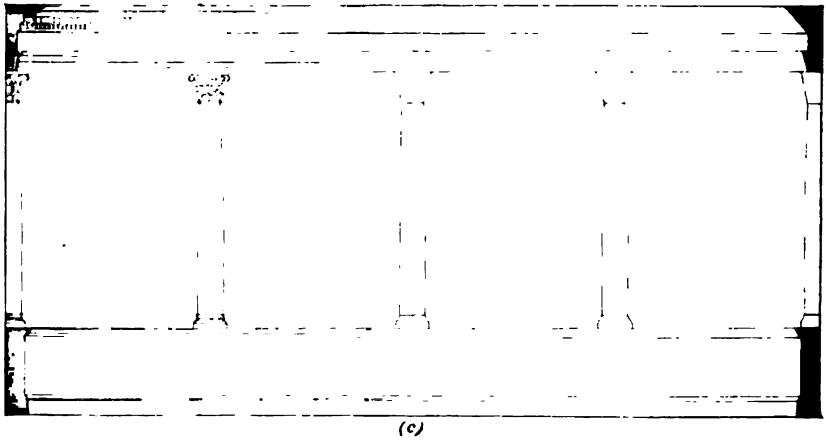
(d)

FIG. 3



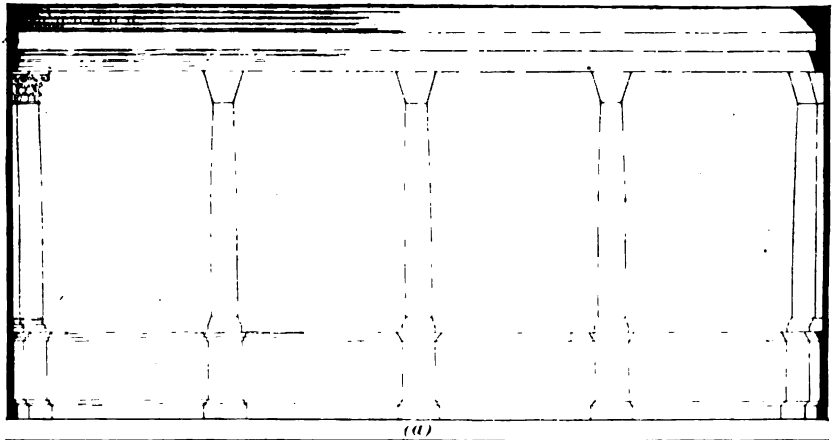
(a)

(b)

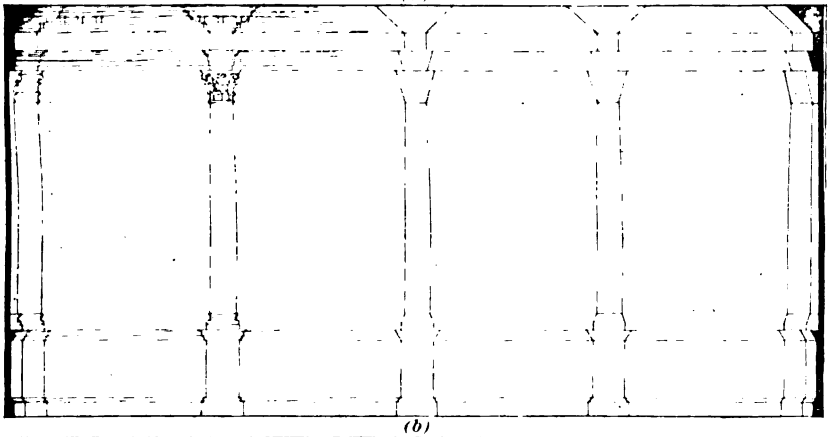


(c)

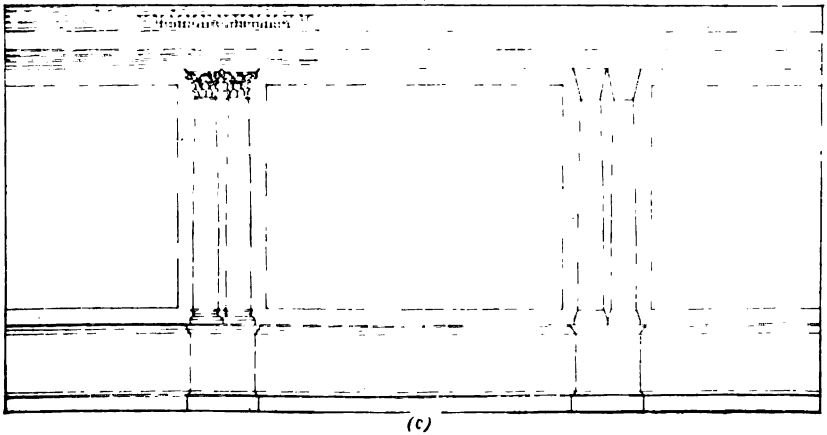
FIG. 4



(a)



(b)



(c)

FIG. 5

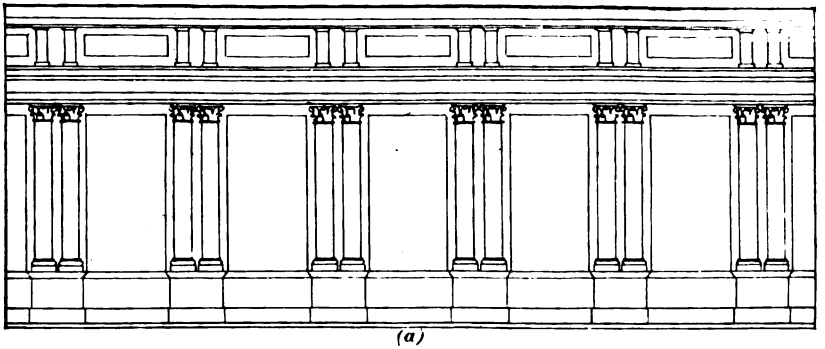
73. With these several fundamental methods of dividing the wall surface, it is possible to attain an almost unlimited variation of treatment before the treatment of the individual divisions—dado, field, and frieze—is considered. The three elementary divisions can be varied as shown in Fig. 1, and the style of decoration then selected according to the proportion decided on; or, if a given style of decoration is preconceived, it will influence the divisions of the surface.

74. The subdivision into three horizontal bands, as in Fig. 1 (*b*), suggests a classic treatment, and a regular molded dado conforming to the pedestal of an order might be introduced with a corresponding frieze in the form of an entablature, as in Fig. 4 (*a*). The vertical subdivision shown in Fig. 3 (*b*) suggests the treatment of column and entablature, as in Fig. 4 (*b*). The paneled field between the dado and the frieze, as in Fig. 3 (*c*) and (*d*), suggests the treatment shown in Fig. 4 (*c*), or a combination of the treatments shown in Fig. 3 (*b*) and (*c*) can be effected by the arrangement shown in Fig. 5 (*a*) and (*b*).

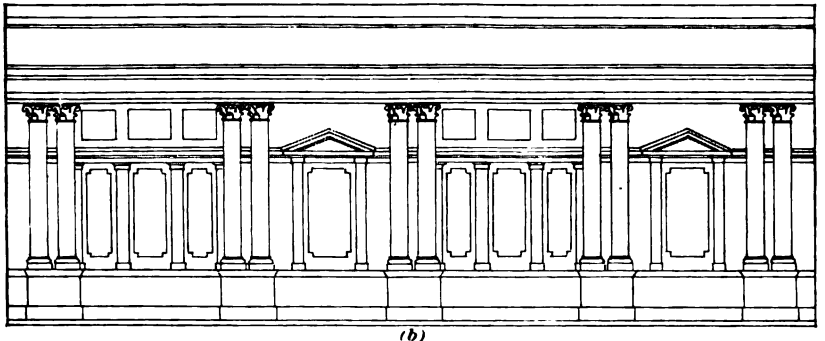
In Fig. 5 (*a*), the general treatment consists of a horizontal subdivision into dado, field, and frieze, the same as in Fig. 4 (*c*), but the vertical subdivisions are carried from the frieze to the floor by breaking out individual pedestals under each pilaster. In Fig. 5 (*b*), the vertical elements are still more emphasized by breaking out the frieze over each column and the pedestals under them. Thus, while the field panels remain the same as in Fig. 4 (*c*), the vertical elements extend from the ceiling to the floor and the apparent height of the ceiling is much increased.

The classic treatment of walls may be further elaborated by using columns instead of pilasters; by coupling the columns, as in Fig. 5 (*c*); by introducing pediments over the openings; or by introducing an inferior order as a decorative scheme in the panels, or bays, between the columns.

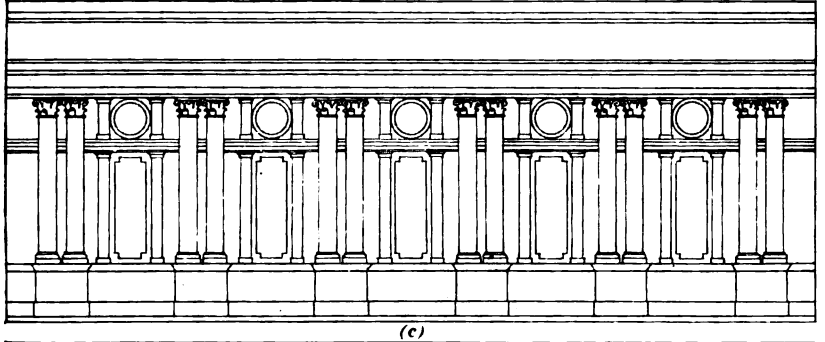
75. In Fig. 6 are shown several variations of the treatment of wall panels separated by columns. The principle involved is the same as in Fig. 4. The subdivision in



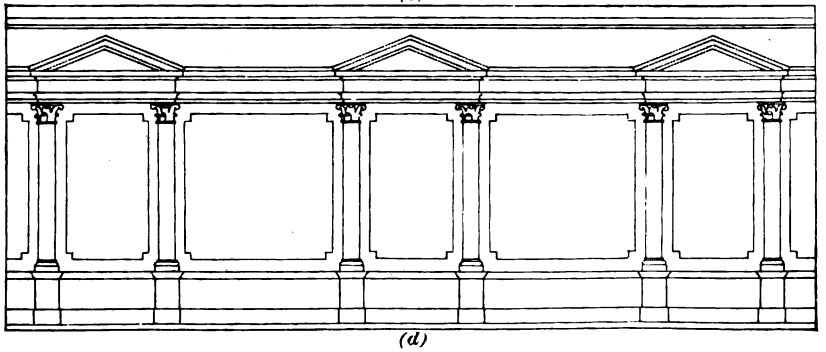
(a)



(b)

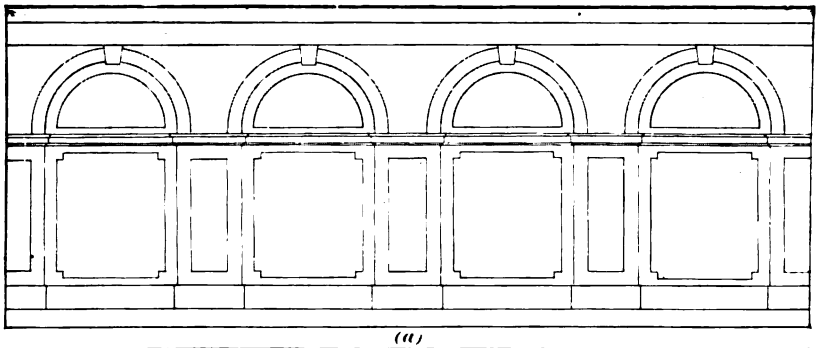


(c)

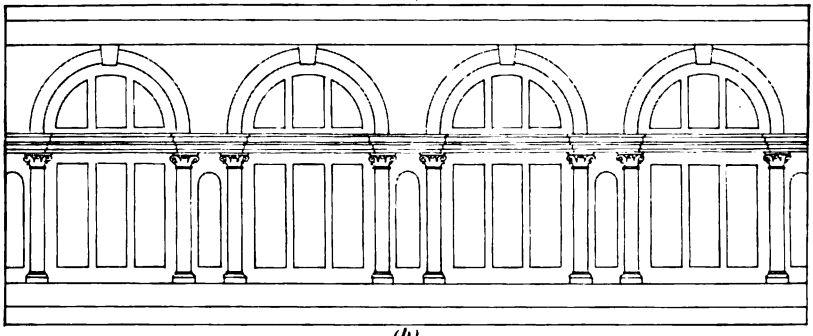


(d)

FIG. 6



(a)



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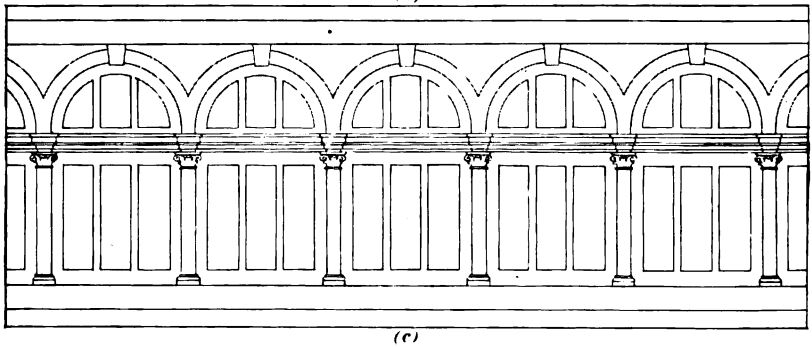

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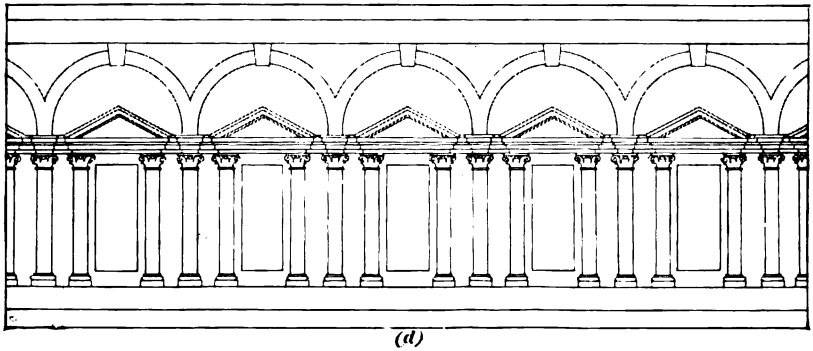


(d)

Fig. 7

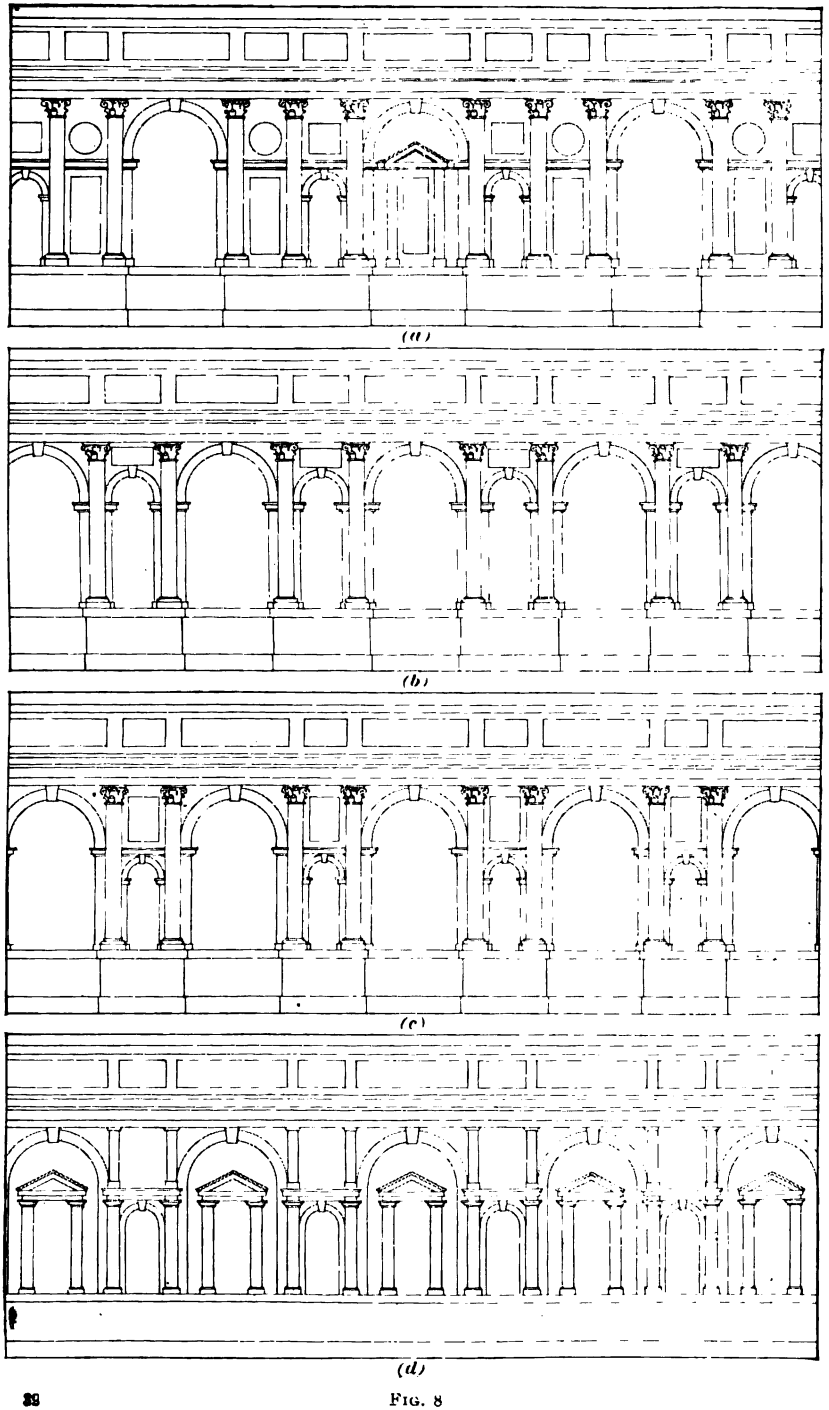


FIG. 8

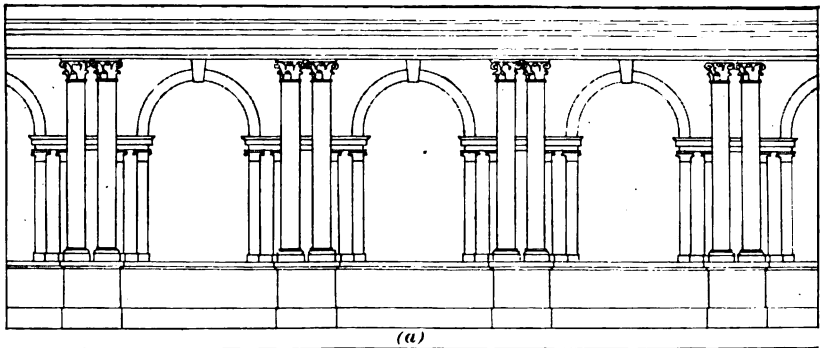
Fig. 6 (*a*) is effected with perpendicular elements consisting of two columns with a single panel between, while in (*b*) a similar treatment includes, alternately, three panels and one pediment over an inferior order. In (*c*), an inferior order is introduced, as in (*b*), with a panel and circular eye above. The treatment in (*d*) introduces a pair of columns with a pediment and a panel enclosed between. These panels might be in some instances windows or doors and suggest a treatment for the introduction of these details in the side walls.

76. In Fig. 7, broad piers, or pilasters, subdivide the walls into panels, over which arches are thrown, introducing circular elements that may be treated as individual panels, as in (*a*), or as groups of panels, as in (*b*) and (*c*). In (*d*), a pediment is used over two columns, while an arch groups the whole.

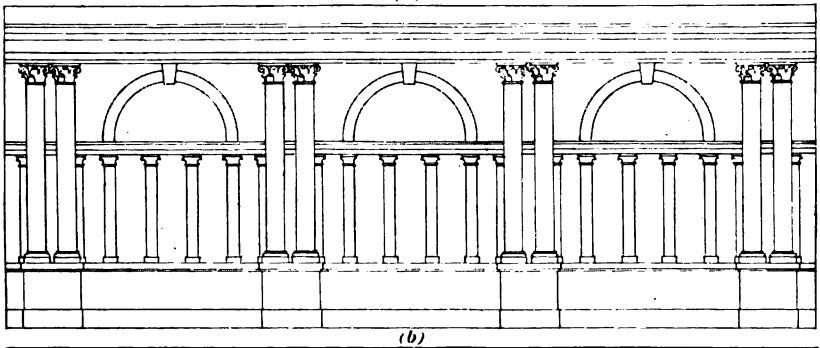
77. The combination of full orders and inferior arches is shown in Fig. 8, where, at (*a*), the wall is divided alternately by columns into narrow and wider panels, and a circular opening is maintained between. In (*b*), the circular opening is introduced between all the columns, and in (*c*) the general treatment is precisely the same, except that the circular opening between the closely spaced columns is inferior to the opening between the wider spaced columns. In (*d*), a pediment is introduced, thereby rendering the decoration somewhat more complex.

78. In Fig. 9, the columns, so far as the subdividing detail is concerned, are carried out the same as before, but the arches are treated independently, partly with an inferior order, as in (*a*) and (*b*), and partly as separate architectural compositions, as in (*c*) and (*d*).

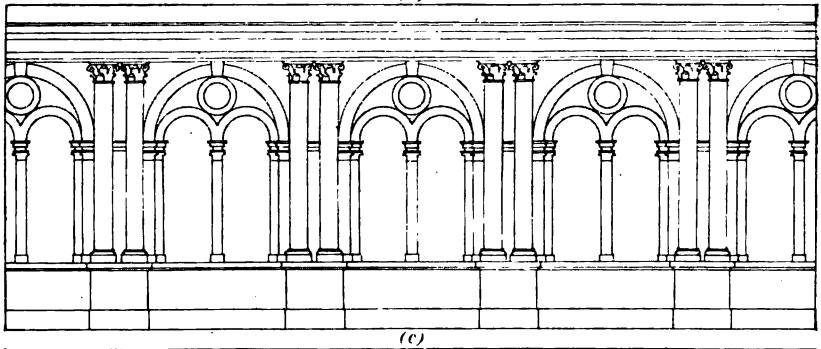
79. A more monumental treatment, suggested by a combination of the arrangement shown in Fig. 4 (*b*) and that in Fig. 9, is illustrated in Fig. 10 (*a*) and (*b*), but here tall columns are carried from floor to frieze, the space between them being subdivided as shown in Fig. 1 (*a*), and



(a)



(b)



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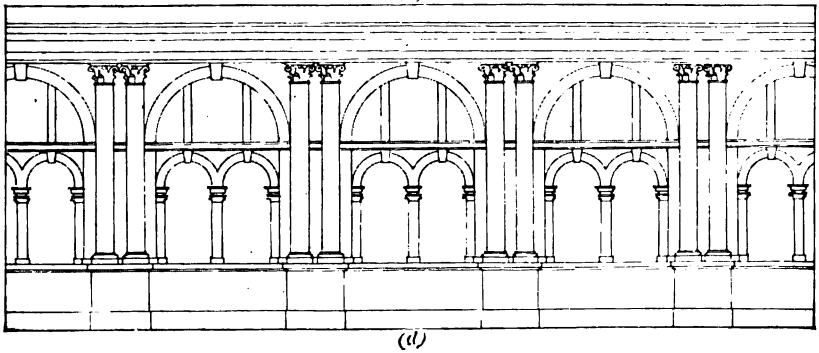
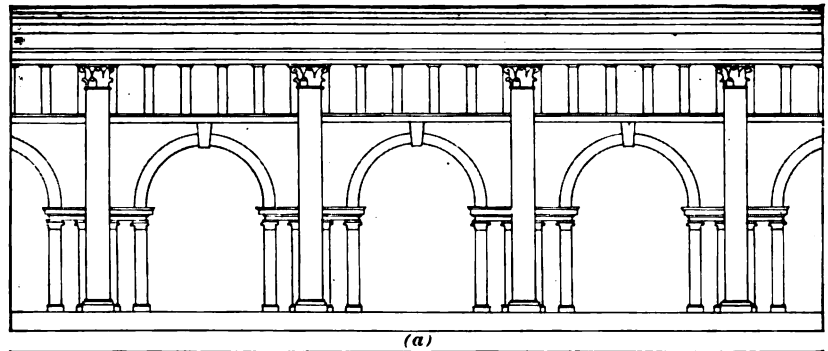
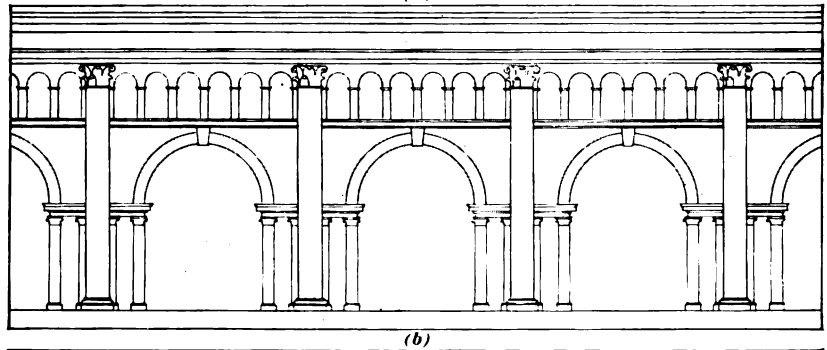


(d)

FIG. 9



(a)



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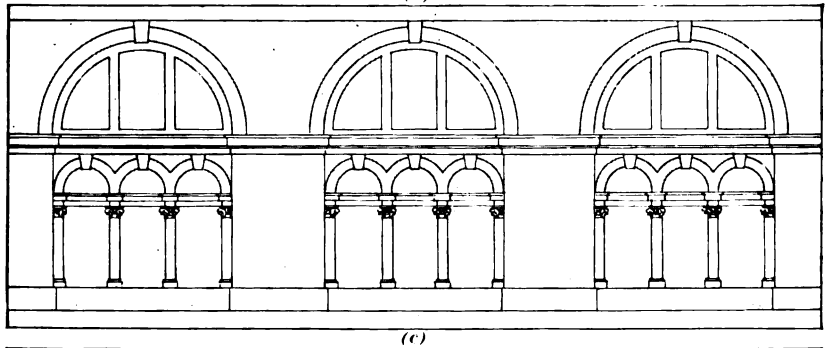

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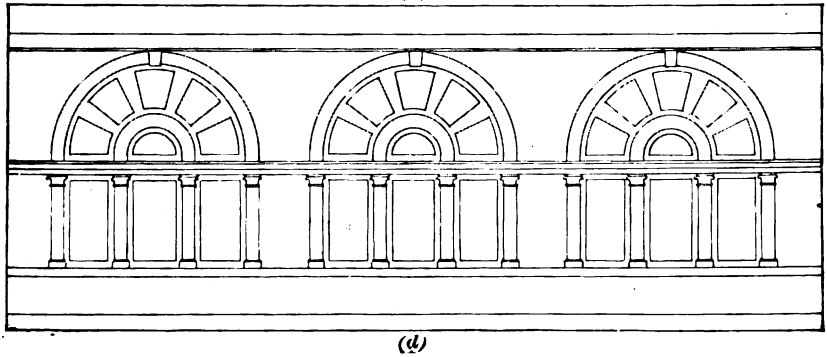


(d)

FIG. 10

the subdivision effected by the introduction of architectural details. These variations of wall surfaces can be carried out for exterior as well as interior decoration, but for the latter subdivision, variety can be effected by a combination of actually existing columns and pilasters, while the wall surface itself can be treated in the flat.

In Fig. 10 (*a*) and (*b*), the columns extend from floor to frieze, and the wall surface back of them is decorated with inferior pilasters and arch moldings run in the plaster; however, a slight variation of the architectural division could be effected in conventional rendering of the interior order and the frieze details against the wall surface. This style of treatment is sometimes found to be convenient in dividing large surfaces in a simple manner, but in treating such surfaces, no attempt should be made to show architectural details deceptively. The treatment should proclaim itself simply a wall painting, and not an imitation of surface decoration in relief.

80. Most of the subdivisions shown in Figs. 6 to 10 are suitable only for large and monumental rooms. A number of details crowded into the small space of an inferior room would only destroy the effect of unity in design. Taken as a whole, any system of design must maintain simplicity, and simplicity can be effected with the preceding combinations only when the room proportions are so great that especially large details will not be out of place.

In selecting a surface decoration or a system of subdivision, therefore, the designer should not endeavor to fit any one of these systems to the room, but should select one that is best suited and that naturally applies to the problem involved.

81. The subdivision of wall surfaces thus far considered is according to the classic system. The Gothic system is diametrically opposite; there is no attempt at symmetry of detail nor any direct subdivision according to given proportions. Therefore, the style of treatment shown in Fig. 3 (*a*) and (*b*) is more suitable for a Gothic scheme, although late

Gothic runs into a balance and symmetry, as in the arrangement of its arcades and exterior details modern Gothic effect is frequently found in subdivision suggestive of balance and symmetry.

Gothic interiors, though frequently executed in stone and marble, are usually characterized by oak panels and wainscot and a wall treatment in diaper work characteristic of the period. All woodwork in Gothic interiors can be made extremely characteristic by giving careful attention to the carved foliation and treatment of the surface, as with window tracery. The pointed arch with cusp and foil are used, and even interior gables with crockets and finials are occasionally introduced. Paneled wooden walls were characteristic of Gothic domestic interiors in all periods, and these can be well worked into Gothic schemes of the present day. The upper walls were usually left bare and hung with tapestry. This scheme can also be carried out at the present time, or these walls may be decorated with fresco.

The student should ever bear in mind that these proportions and arrangements are only suggestions of what can be and has been done. Problems frequently arise wherein something entirely different will suggest itself, and these suggestions should always be tried out to determine their fitness. A room should never be forced to adopt a fixed idea because it is desired that the apartment should have a certain historic style. There are many cases wherein the distribution of window and door openings or the structural subdivision of the sidewalls will not permit of some preconceived decorative idea. In such cases the unalterable structural conditions should be emphasized to form prominent elements in the decorative scheme adapted to the conditions.

In a new building the structural conditions can be carried out with the final decorative arrangement in mind, and each can be made to contribute to the success of the final result. In an old building or an alteration, however, it is often difficult to arrive at a satisfactory conclusion, and the endeavor should be to carry out a scheme with the assistance of the existing structural necessities rather than in spite of them.

MATERIALS

82. Where walls are divided only by horizontal bands, each band may consist of a different material, or all the bands may be of one material, but treated in different ways for ornamentation. In monumental work, such as the lobbies of theaters, public buildings, hotels, etc., marble is the most suitable material for at least a part of the side wall. The dado, or wainscot, may be of marble and the field and frieze of plaster properly decorated; or, the entire wall may be of marble divided into panels by means of pilasters and moldings, as in Figs. 5 to 9. Where either columns or pilasters are used as vertical elements, the pedestals and bases should be of marble, but the filling may be of any suitable material that the conditions require.

For large private dwellings, marble is sometimes used for the main-entrance hall, but fine woods are usually more suitable. The treatment may be either classic and severe in polished marble, or modern Renaissance or Gothic in mahogany, oak, or some other suitable wood. Sometimes, soft and cheaper woods that are painted with several coats of white paint and enameled on the last coat are used. This treatment is particularly suitable for the late English Renaissance, or Georgian, period and for the contemporary American Colonial style, which is similar to it.

83. Oak paneling is characteristic of the Gothic style, being used for the entire side wall or for the wainscot, with a tapestry treatment for the field. Mahogany was used to a great extent in the French Renaissance, particularly in the Empire period, with gilded capitals on the columns and pilasters and much gold appliqué work in the friezes. Tapestries and painted decorations were used in the field, and polished hardwood overlaid with rugs constituted the floor treatment. Generally speaking, however, modern walls are treated with one or more of the following materials: Natural wood, canvas, burlap, silk, leather, paper, painted wood, or painted plaster.

WOODS

84. A characteristic feature of modern interior decoration is the lavish use of wood for columns, beams, ceilings, paneled wainscots, and polished floors. Modern halls, libraries, dining rooms, etc. are frequently paneled with a high wainscot and furnished with built-in bookcases, cabinets, lockers, seats, etc. Each of these wooden constructions must be finished with some sort of stain, varnish, paint, or enamel that will either bring out or hide the characteristics of the grain, and thus make the wood harmonize with the purpose of the room and the style of the decoration. Therefore, in considering the kind of wood that is to be used to secure an interior effect, attention should also be given to the finish that the wood will take in order to give satisfactory results as to service and appearance.

While there is no limit to the number of woods that are available for interior finish, there are comparatively few that need be considered at present. These few, namely, oak, mahogany, maple, birch, ash, and cherry, will serve all purposes of ordinary practice, as the others are used only in localities where the kinds just mentioned are expensive, or where peculiar conditions of design or tradition require their introduction. At the present time, oak, mahogany, and maple enter more largely into the general woodwork decoration of the modern house than any other specific woods. Of course, other woods are used, but more often in imitation of one or the other of the preceding. Oak, mahogany, and maple are never stained to imitate something else, as the grain and the color of these woods are beautifully characteristic in themselves. However, cheaper woods are frequently stained in imitation of oak and mahogany, although the practice is not a good one.

85. Oak is frequently treated with different stains in order to give some particular or historic effect. Thus, for instance, there are antique oak, which is nearly a natural finish; golden oak, a darker finish; and English oak, a very

dark finish. Besides these, more modern finishes provide Flemish oak, mission oak, weathered oak, etc., all of which are simply variations of color in the stain or filling applied to the wood to give it a characteristic effect.

As a rule, mahogany is finished in two styles only—natural finish and old mahogany. In the same manner as oak, birch partakes of a variety of tones according to the stain used; but, owing to the peculiarity of its grain, every effort should be made to use a system of treatment that will bring out its beauties.

Oak is frequently imitated in ash and chestnut, both of which present beautiful grain effects in the ordinary sawing; but neither can compare with oak in the quarter-sawed graining. Ash has a more open grain than either oak or chestnut, but pieces of both ash and chestnut can be selected that will present, under proper treatment, a fairly good counterfeit of oak. Cherry and oak are sometimes stained to represent old mahogany, and the grain in many cases is quite similar. The color, however, is never so rich as the natural wood, and such imitations are to be avoided.

86. The kind, quantity, and finish of all woodwork should always be fully considered when the general scheme of a room is worked up, as each period or style demands separate consideration regarding construction, material, treatment, and color.

The trim of door and window openings being generally of wood, the wall treatment should be made to harmonize with it. The openings may be framed with simple unmolded bands, or they may be treated classically with pilasters and pediments or with simple crowning entablatures. In such cases, the part of the wall underneath the window is paneled as a low pedestal or a parapet. Between the vertical elements, a wooden wainscot is usually paneled in uniform repeating panels or in a series of panels of alternating sizes. The sizes of panels will be governed by the style of the design and the characteristics of the wood of which they are composed. All woods shrink more or less, and small panels

are less likely to show the effects of shrinkage than large ones. With hardwoods, such as mahogany, maple, etc., the panels should be of three thicknesses, with the grain of each turned in opposite directions; the outside pieces being laid with the grain lengthwise, and the intermediate piece, or core, with the grain crosswise. The core may be of a different wood, but the surface pieces should be of the same wood. Panels thus built up will not warp, and the shrinkage or the swelling due to the various conditions of the atmosphere will be slight. Large unpaneled surfaces, such as continuous wainscots, may be built up in this way of three or four thicknesses; they will then withstand severe atmospheric changes.

87. When used for ceilings, wood is usually framed to represent beams and girders with wooden panels between. These beams are usually *false;* that is, they consist of boxes that are either framed under the real beams of the story above or built against them and independent of the structural conditions entirely. The moldings used on such beams vary somewhat with the style, but they usually conform to the architrave or the entablature of an order in classic work or to simple paneled beam work in the Gothic.

Wooden columns more than 6 or 8 inches in diameter are best constructed of staves or a series of vertical pieces that are tongued and grooved together and glued up to form a hexagonal, an octagonal, or some other prismatic form, and then turned to size in the lathe. Solid columns should be bored lengthwise through the center, so that changes in atmospheric conditions will not cause them to split.

Wooden pilasters more than 2 inches in depth should be boxed, and not formed of solid pieces for reasons similar to those just mentioned. Bases of columns and pilasters should be separate, with the grain running horizontally, or they may be mitered at the angles. For small examples, capitals of wooden columns should be carved from solid blocks; in other cases, they should be carved from built-up blocks. Gilded capitals are sometimes executed in plaster or in composition.

CANVAS

88. Canvas is used for a wall decoration over plaster, when painted decorations are desired. The canvas may be glued directly to the plaster and the decorations executed on it in oil paint, or it may be stretched on frames and inserted in panels, as the case may require. In the latter case, the canvas must be protected on the back, to prevent it from being punctured accidentally. Canvas is also used where a smooth, even surface of one color is required, as it takes paint readily and its texture presents a surface that is very pleasing to the eye.

BURLAP

89. Burlap is extensively used for simple residence work and for temporary decorations, such as booths and scenic effects. It can be procured in several qualities and in many colors, including gold, silver, copper, etc. Burlap can be rendered fireproof when necessary, and it presents a most valuable fabric for many simple and inexpensive treatments. Dyed burlaps nearly always fade, and this characteristic precludes their use in apartments that receive much strong sunlight. Some of the colors, however, stand well, but care should be exercised in their selection. The finer qualities make excellent and inexpensive hangings, and can be embroidered or stenciled with diaper patterns and borders.

SILK

90. Silk is rarely used except for hangings and furniture coverings, and the heavy brocades are particularly suitable for portières and upholstery. It is very durable and mothproof, and can be easily cleaned after the accumulation of dust. Silk can be obtained in unlimited colors and patterns, and for auxiliary furnishings can be used with any style of art. As a surface decoration, silk is not to be recommended, except for the most delicate treatment of specific rooms. When attached to walls, it is hard to apply, difficult to clean, and shows dirt spots and finger marks very plainly.

LEATHER

91. Leather is used extensively for upholstery and side-wall treatment in libraries, billiard rooms, smoking rooms, cafés—apartments where a certain amount of ease and relaxation is permissible. It is applied in its natural form and color in some cases, or it is embossed and richly decorated in panels in other cases. Leather is durable and sanitary, can be easily cleaned, and lends itself readily to irregular surfaces.

A substitute for leather, known as *Pantasote*, can be obtained in many colors, and for wall treatment it is almost as satisfactory as leather itself. Being a manufactured product, pantasote can be obtained in much larger sizes than the hides of animals. It is even more durable than leather, is acid-proof, non-combustible, and unaffected by water, and lends itself well to yacht and boat-house decoration.

PAPER

92. Wall paper is probably more used for wall and ceiling decoration than any other material. It can be obtained in rolls varying from 18 inches in width, in American manufacture, to 22 inches in width, in foreign manufacture. The cost of wall paper varies from a few cents to as many dollars per roll, and this material is suited in design to every class of apartment except those in which crowds assemble, as rough usage would tend to wear or deface it. Wall paper is manufactured to imitate each of the materials that have been considered, and where an imitation is permissible, it presents a counterfeit that is hard to detect. Wall-paper designs can be obtained that correspond with every style and period of architecture, and in combination with other materials, it can be used with great economy to obtain satisfactory results.

The simplest wall paper is plain ingrain, or cartridge, paper, which is manufactured in rolls 30 inches wide, and in plain shades and nearly all colors. This kind of wall

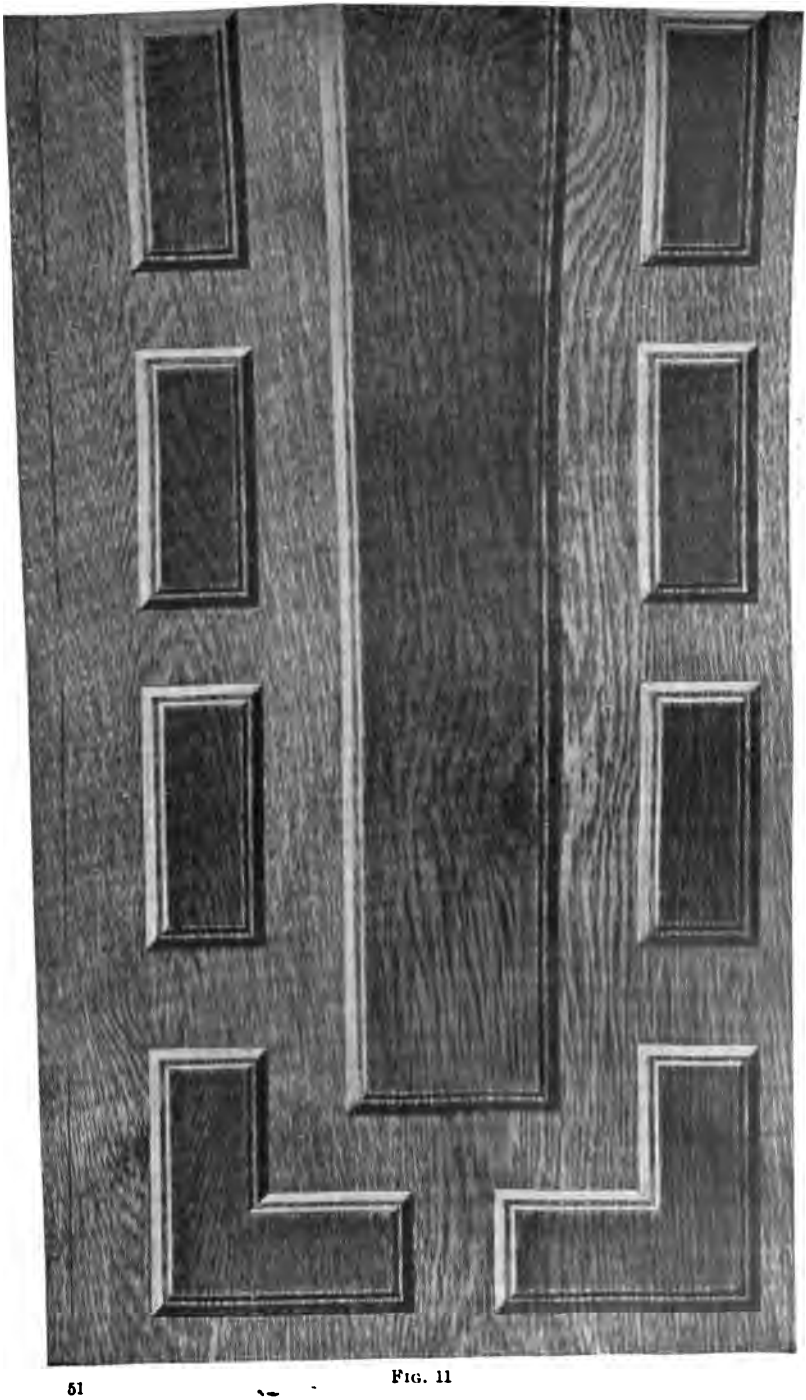


FIG. 11

paper lends itself well to a room in which a figured paper would be out of place, and it can be stenciled or decorated in water color to secure an unlimited variety of effects. It is sometimes used as the basis of a printed paper, thereby furnishing at once the combined softness of the ingrain surface and the stenciled or stamped decoration.

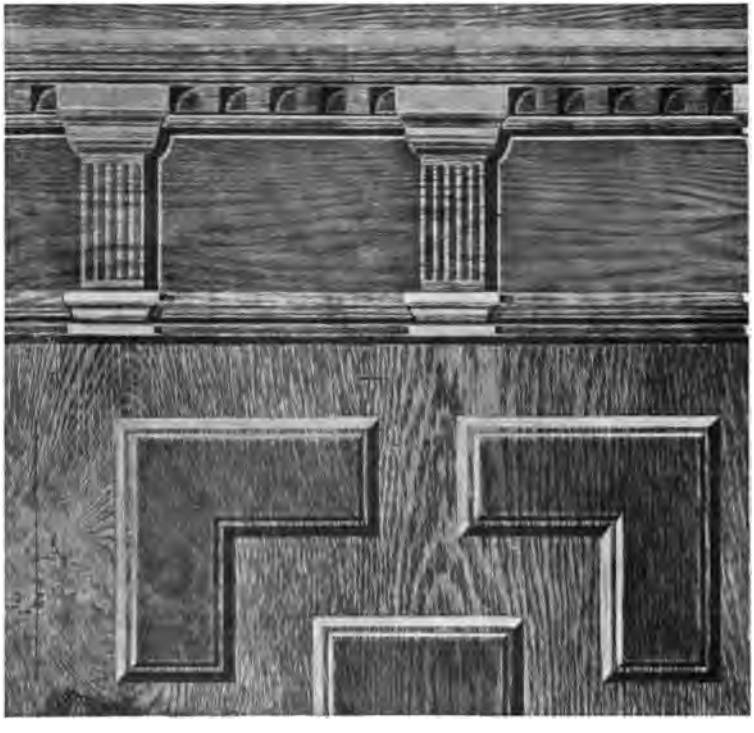


FIG. 12

Printed wall papers present such a variety of designs and such a change of style from year to year that the latest style books must be consulted to learn what is in vogue. The examples here given are only a few of many styles put out by various manufacturers, and have been selected to illustrate the variety of style that the market affords.

Fig. 13

93. Imitation of Wood Paneling.—The example shown in Fig. 11 is an imitation of wood paneling in antique oak. The use of this style of paper is limited to positions and conditions where such an imitation is permissible. With the light falling on the wall from above and to the left,

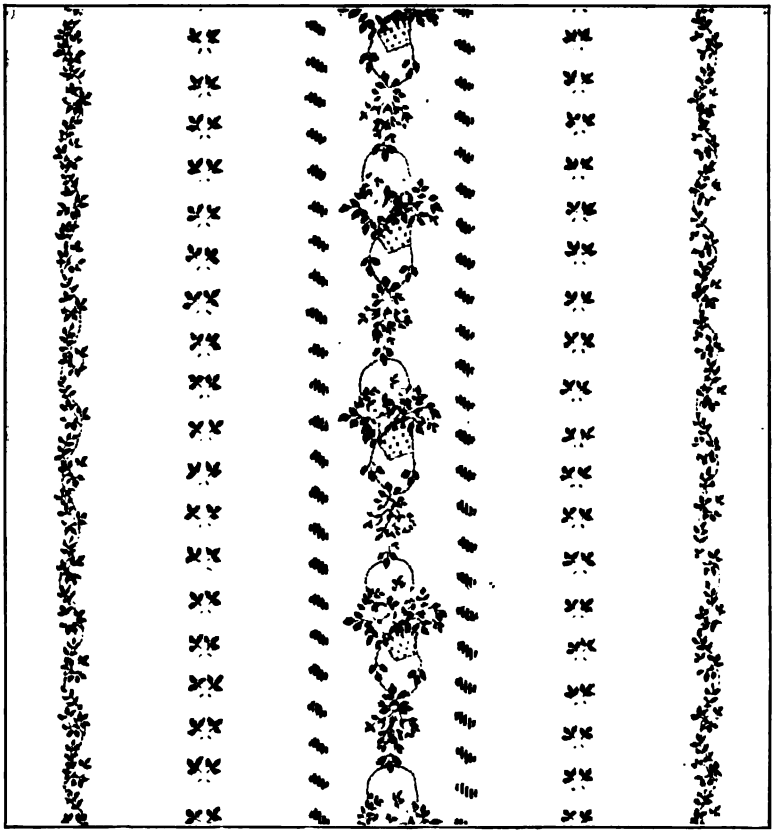


FIG. 14

this paper presents the appearance of raised panels against a flat ground, whereas, by inverting it, the appearance of sunken panels with raised stiles and rails is obtained. In the former position, the crown shown in Fig. 12 is used as a finish at the top, but in the latter position, another style of

161 § 49 FIG. 15

FIG. 16

Fig. 17

crown and a base is necessary. This paper is faulty in design, however, as the structural conditions are false. The grain of the rails runs vertically across them, whereas, in actual framed paneling, the grain should be horizontal in the rails and vertical in the stiles. It is suitable only for a dado treatment, and another paper would be required for a field design.

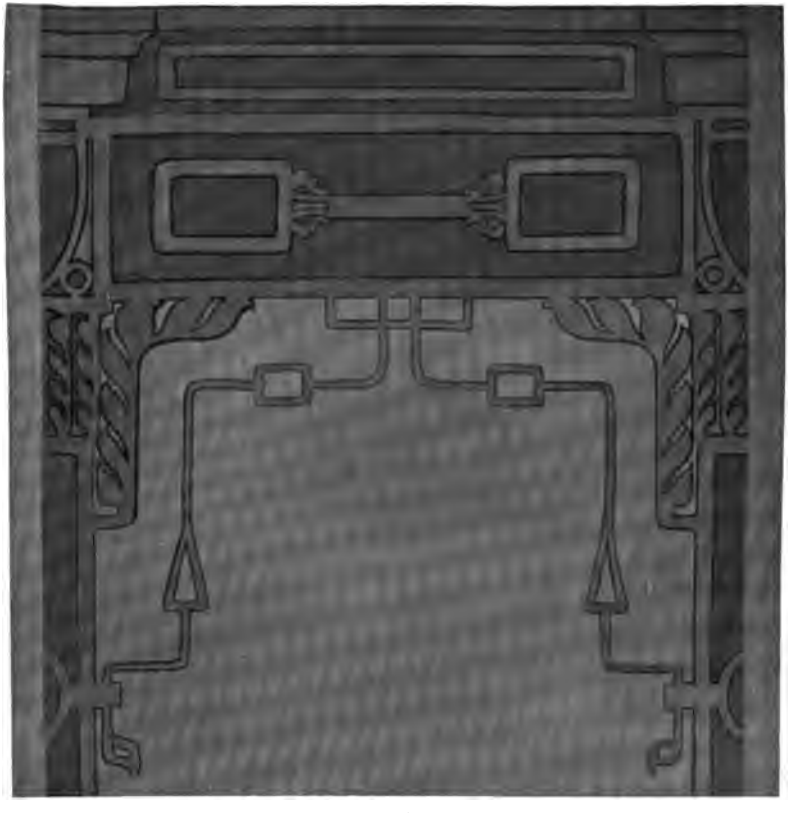


FIG. 18

94. Imitation of Canvas, Etc.—Another dado design, suitable for a stencil decoration on canvas, burlap, or ingrain, is shown in Fig. 13. The treatment in this design is extremely conventional, and in the example shown was executed in several shades of green.

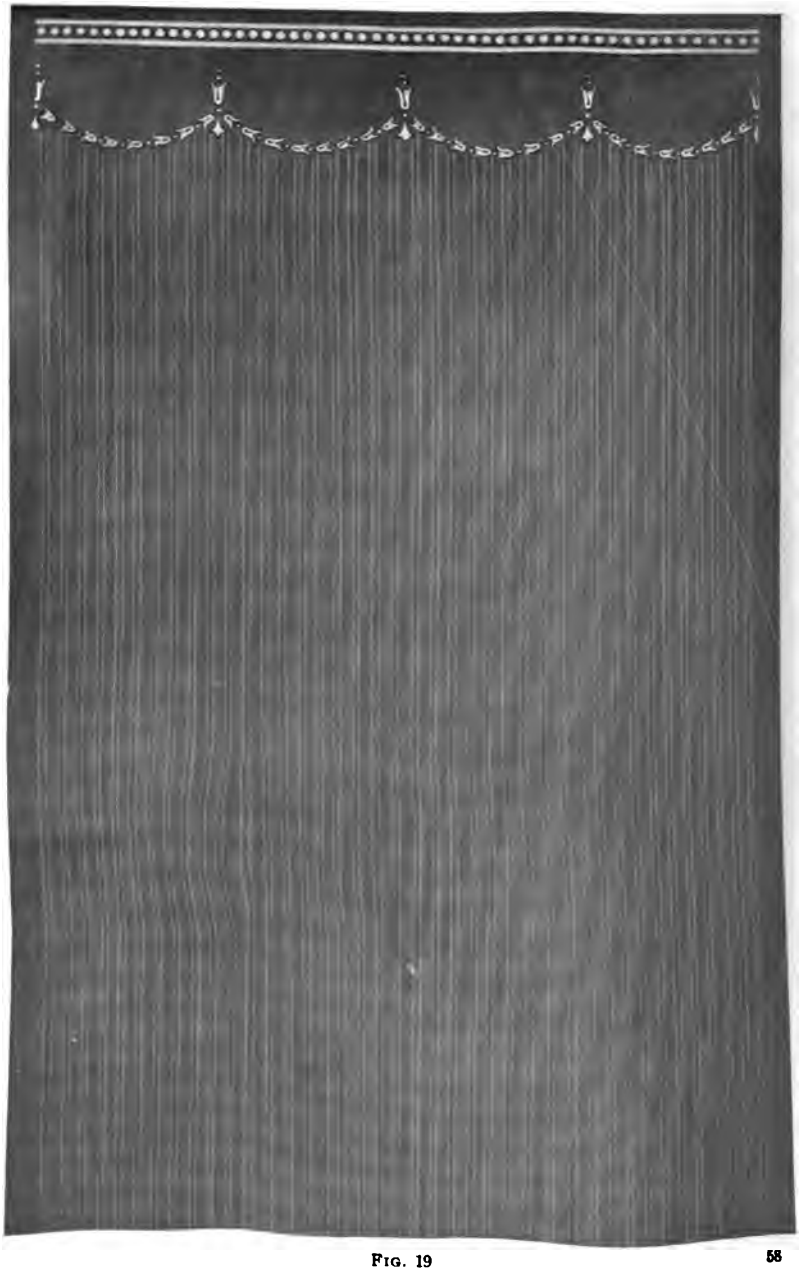


Fig. 19

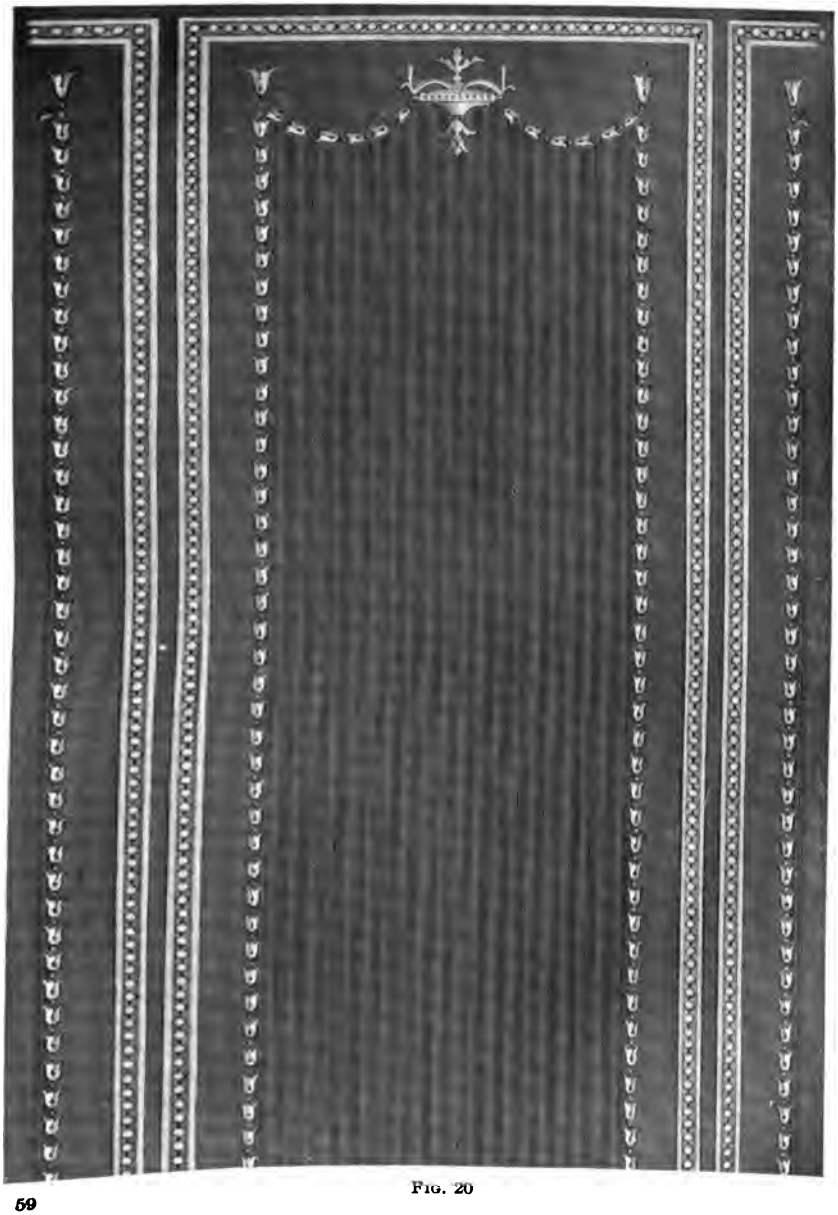


Fig. 20

95. Imitation of Silk.—A silk-brocade effect is shown in Fig. 14. This design was made up from an actual piece of old silk, and shows the silken texture of the background in creamy white, with the flowers and leaf-effect embroideries thereon in reds and greens. This style of wall paper is suitable for bedroom treatment, but should always be included under a frieze, as the effect of stripes from floor to ceiling is very unsatisfactory.

96. Imitation of Leather.—Designs in imitation of leather are shown in Figs. 15 and 16. Each of these is worked on a very heavy paper, with the design deeply stamped, as in embossed work. The characteristic markings of the hide are also impressed in the surface of the paper, so that the imitation is very deceptive. For a lounging room or a den, the paper shown in Fig. 15 is very effective, and it lends itself to an Oriental and luxurious treatment with plenty of brasswork and Eastern implements in the accessories. The design of the example shown in Fig. 16 is more conventional but less suggestive of historic style; however, it is equally adaptable to decorative schemes of the L'Art-Nouveau or the arts-and-crafts school of design

97. Examples of Simple Wall-Paper Treatment. The following designs are examples that are not imitations of other materials, but rather examples of simple wall-paper treatment. Fig. 17 shows the central portion of a simple panel design that can be cut to any length and finished, top and bottom, with the crown and foot-piece shown in Fig. 18. It is a conventional design in three shades of olive green, and is appropriate for a hall, a library, or a dining room that is to be decorated in the craftsman's style of treatment.

98. Simple stripes in two shades of blue, buff, or pink often provide a suitable treatment for a small reception room, particularly where the ceiling is low and a deep frieze cannot be considered. In Fig. 19 is shown a combination of this character, in which the stripes are laid first and the crown effect is applied above. The stripe effect can be varied by subdividing the wall into panels, as in Fig. 20,

and if a deeper crown is desirable, additional designs can be obtained, as shown in Fig. 21.

99. A simple conventional design, with heraldic devices, is shown in Fig. 22. This paper is printed in four shades of the same color, and is suitable for a side wall over a plain ingrain of the same tone as the ground color, on which shields, crests, spot patterns, or other suitable devices may

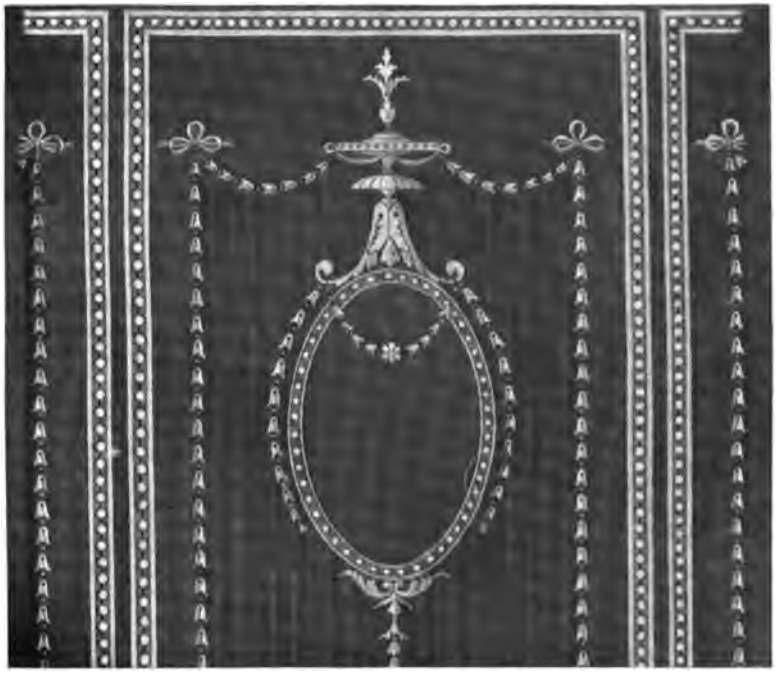


FIG. 21

be stenciled in a spot pattern. Simple tapestry effects may also be used under this design as a field filling, or, in some extreme cases, the panel device shown in Fig. 10, with the frieze omitted and the panel work carried out symmetrically at top and bottom, may be employed. The frieze is appropriate for a modern Gothic interior or an adoption of the craftsman style.

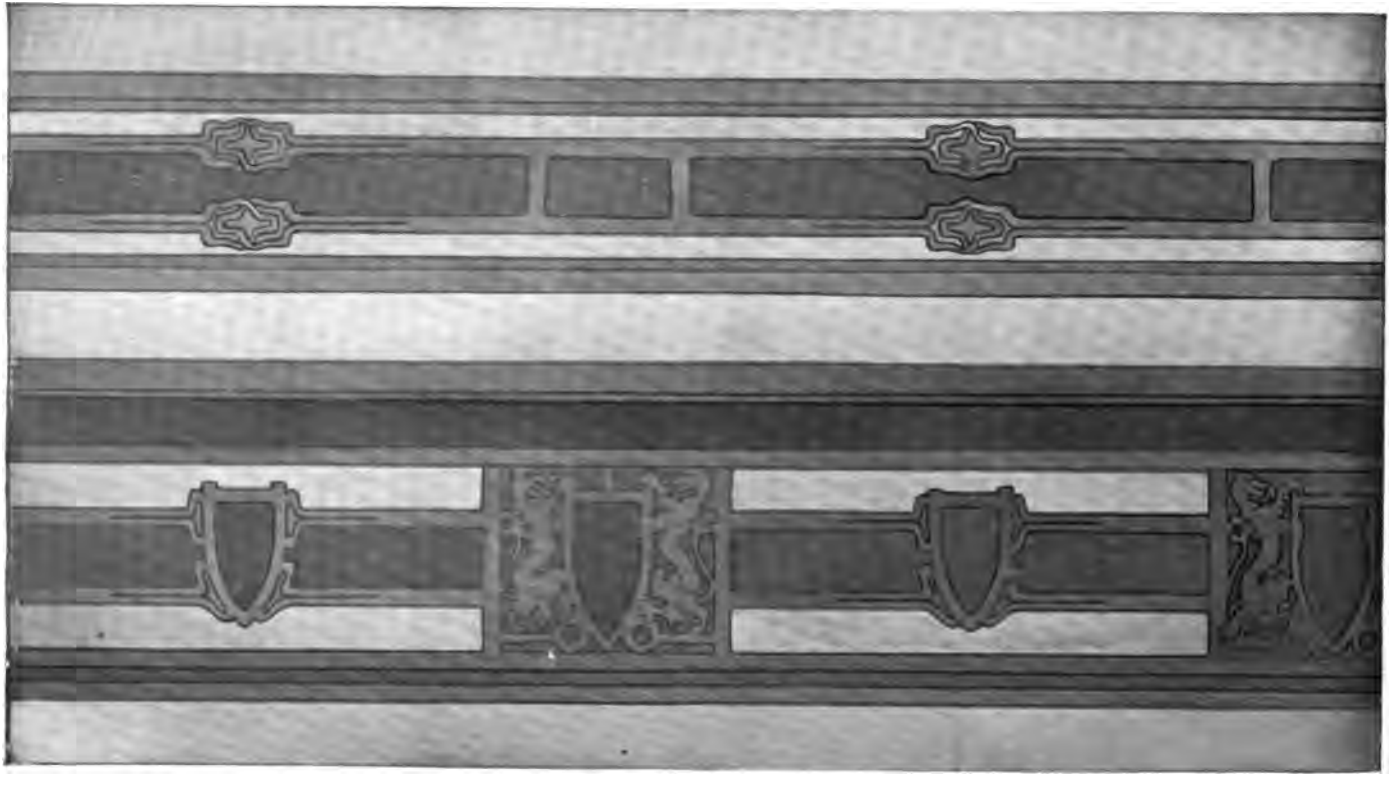
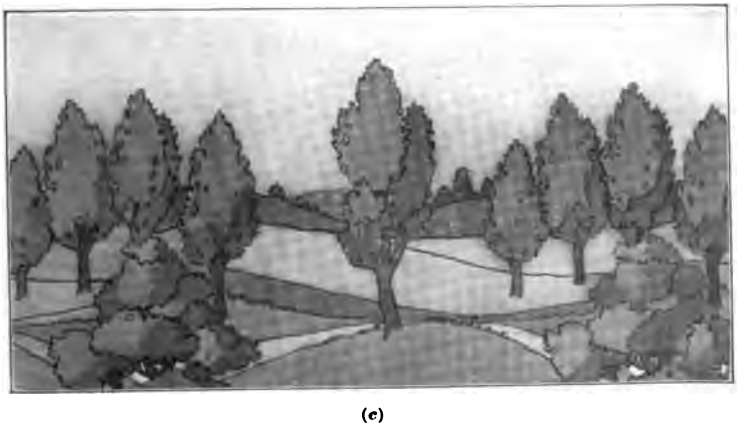


Fig. 22

(*a*)

(*b*)



(*c*)

FIG. 23

100. Another design suitable for a Gothic room is the frieze shown in Fig. 23. This design is made in three sections, so that variety can be obtained as the procession of Crusaders is seen from different points in the room. These sections can be united so as to make the groups of figures

(*a*)

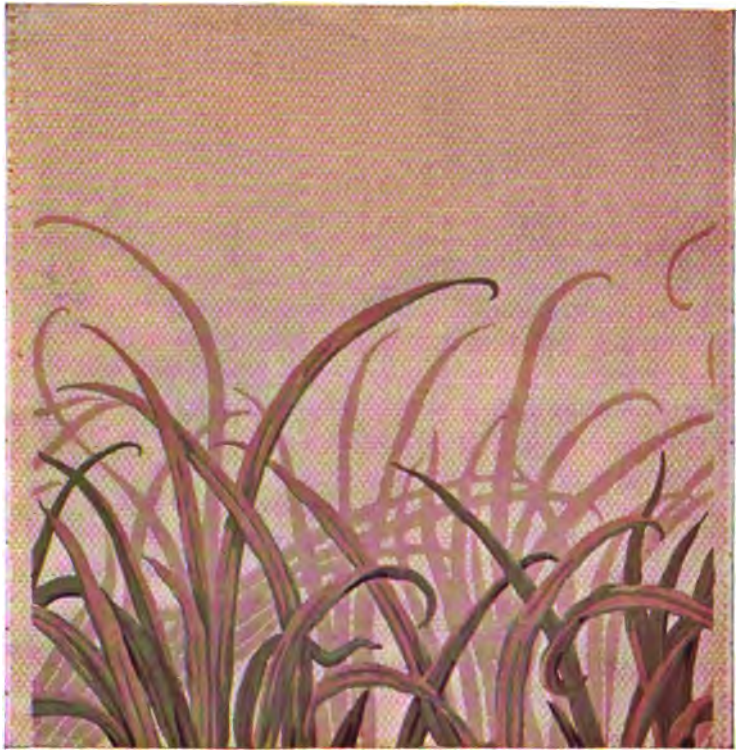
(*b*)

FIG. 24

vary in number and extent with sections of conventional landscape between, or the landscape section can be repeated with another landscape piece that is designed to fit it, so that the figure groups may occur only once or twice in a room frieze, or even be omitted entirely. With skilful handling,

161 § 49

FIG. 25



161 § 49 (a) FIG 26 (b)

many different combinations can be effected that will afford a variety of design with any of the simple repeating friezes.

101. Another frieze design based on a similar principle, but of a more frivolous nature and therefore more suitable for a nursery or a child's room, is shown in Fig. 24. As in the previous designs, there are other sections that can be fitted in between the ones shown in (*a*) and (*b*). These will permit the landscape or the procession of geese to be extended, and thus make it possible that the entire frieze shall be of either subject by itself, with the other as an incident here and there.

102. A most ingenious design, with a crown effect instead of a frieze, is shown in Fig. 25. The hanging consists of a naturalistic rendering of swamp grasses in a tangled growth that completely fills the field. Over this design, two crowns are hung, the one shown in Fig. 26 (*a*) providing the tops for the grasses and introducing a pair of flying ducks, and the other, in (*b*), simply topping out the grasses. When arranged judiciously, this design makes an attractive decoration for any of the public rooms of a country club or it may even be used in a mountain bungalow.

APPLICATION OF MATERIALS

103. When the subdivision of the wall surface is determined upon, the material to be used for the filling should also be considered, for it is necessary to have in mind what is to be used between the columns or the pilasters when these details are to be used as vertical elements of division. Panels thus formed should be filled with severely conventional designs or with plain color, as they are likely to be partly relieved by pictures, and an obtrusive design would detract from the decorative value of the pictures themselves. The materials best suited for this purpose, where marble or wood paneling is not to be considered, are burlap, canvas, leather, ingrain paper, or painted plaster, any of which may be stenciled with a simple diaper or a spot pattern if desired.

When the subdivision is effected in the "flat," without projection pilasters or columns, certain combinations of wall paper, which will be given in detail can be adopted.

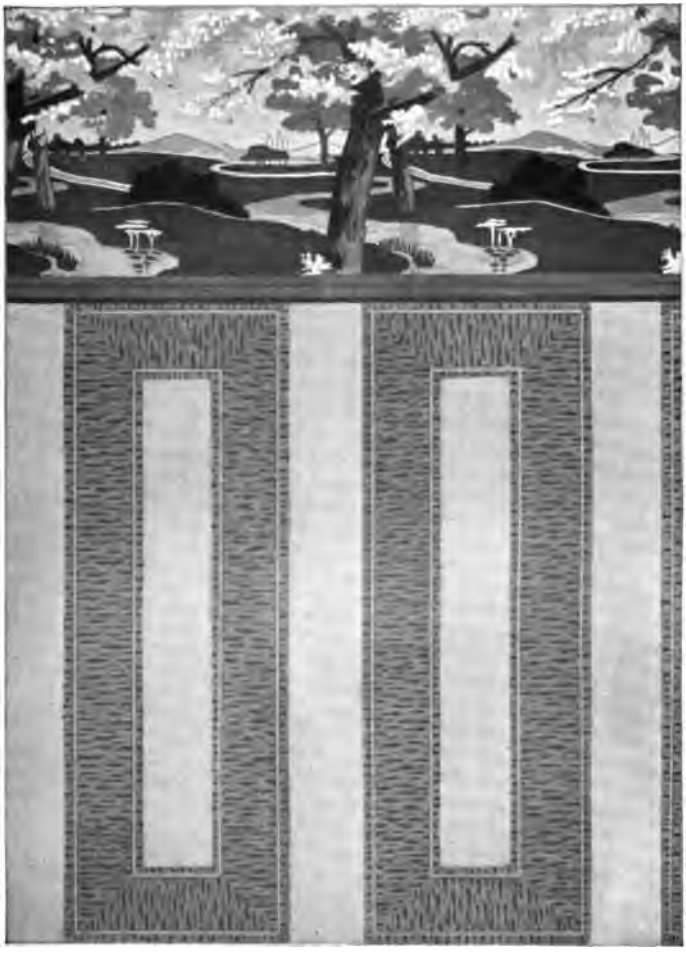


FIG. 27

104. For the subdivision suggested in Fig. 1 (*a*), a stock frieze and hanging, with a ceiling paper to match, may be used over the dado. The dado may be either of wood or of ingrain paper with a wooden rail about the height of a chair

back along the top. This wooden rail protects the wall from injury when furniture is pushed back against it, and is known as the *chair rail.* In bedrooms and apartments having low ceilings, the dado should be omitted and the hanging carried from the baseboard to the frieze.

105. For the subdivision shown in Fig. 3 (*a*), which rarely occurs, panels can be formed of such designs as those shown in Figs. 15, 16, 17, 18, and 19. These designs are suitable for a low ceiling, where there is little or no room for a frieze.

106. For the subdivision shown in Fig. 3 (*b*), any of the frieze effects previously described can be used in connection with a field of any suitable material hung in panels to the baseboard. A suggestion for this would be to use the frieze shown in Fig. 22 with panels composed of the designs shown in Figs. 17 and 18. These were designed to be used in such a combination or to be used separately, as desired.

It is not necessary, however, to use only stock-panel designs for the field. The decorator can work up many unique effects by using stock stripes and cutting them to form panels under a suitable stock frieze, as shown in Fig. 27. Where a conventional landscape frieze is used over a plain, striped ingrain paper, pieces of the dark stripe may afterwards be cut out and inserted both at the top and at the bottom to form panels. Almost any stripe can be used in this way if a little ingenuity is exercised to fit it to the style and conditions required.

107. For the subdivisions shown in Fig. 3 (*c*) and (*d*), any of the foregoing designs can be used over a suitable dado of wood or over a chair rail that is filled below with plain paper or with burlap. A figured paper for the dado is not to be recommended except where the field is left plain and the frieze is omitted, and even then it should be of a strongly conventional and somewhat structural character. Large square panels and oblong panels, such as are likely to occur in these subdivisions, can be formed of figured paper and a

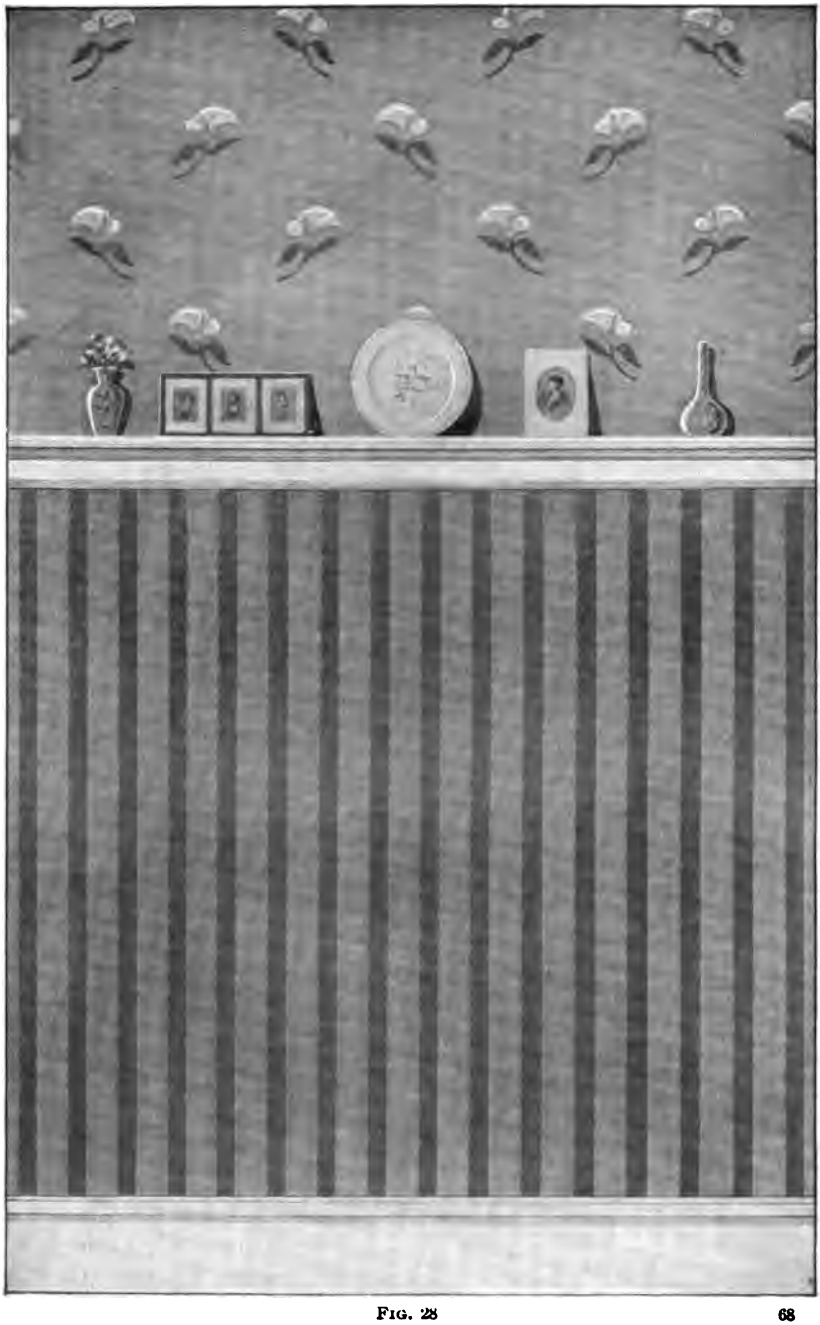


FIG. 28

FIG. 29

suitable figured border, but it is difficult to fit a frieze to such a design.

In any of the subdivision schemes shown in Fig. 3, a prominent molding should be placed at the top of the field. This is usually termed the *picture molding*, as it is from this molding that pictures are suspended by means of brass hooks and wire.

108. For the subdivisions shown in Fig. 1 (*e*) and (*f*), a variety of treatments are possible, each depending on the proportion existing between the upper and lower sections of the wall. A common treatment for bedrooms is to divide the wall one-third from the top and then paper the upper section with a large figured floral pattern, and fill the lower portion with stripes, as shown in Fig. 28, or with a plain burlap or an ingrain, if the height of the ceiling will permit. In either case, the two sections should be separated by a prominent picture molding or a plate rail.

A *plate rail* consists of a shelf from 4 to 6 inches in width with a picture molding below, as shown in Fig. 28. The shelf may be used to support small pieces of bric-à-brac, etc., but no pictures should be hung above it. The plate rail is usually grooved near its outer edge, so as to catch the rims of plaques, or plates, supported on it, from which it derives its name.

109. Another treatment for these subdivisions is to divide the wall about one-third from the bottom, and then paper the lower portion with a design similar to that shown in Fig. 13, and hang the field with plain ingrain to the ceiling. In these subdivisions, fresco or wall-painting treatment in the upper part, with a dado of marble or paneled wood below, may also be resorted to.

110. A combination of the panel treatment suggested in Fig. 1 (*b*) and the one-third division in Fig. 1 (*e*) can be satisfactorily attained by papering the entire wall with an ingrain and then fastening over it wooden battens, or stiles, to form panels under a wide shelf, or plate rail, as shown in Fig. 29; or, the stiles may be built in on grounds made flush

with the plaster when the house is built and the wall surface papered in between them. The former treatment lends itself to the decoration of an old room, while the latter would be the method to follow in a new building. This scheme of decoration is suitable for a library, a dining room, a studio, or a den, and is inexpensive and very effective. If desired, the upper part can be treated with a frieze paper showing heraldic devices or Gothic figures, such as those shown in Fig. 23, or the panels can be filled with leather patterns, such as are shown in Figs. 15 and 16.

This scheme of wall treatment shows that even the simplest ideas can be worked out to result in a most satisfactory manner without involving much, if any, more expense. The few extra dollars required for the woodwork would be offset by the money saved through the omission of a more elaborate paper on side wall and ceiling. An endless variety of subdivisions can be attained by this simple use of battens and a decorative scheme based on this idea can be made as inexpensive or as costly as the designer may desire. The idea should not be looked upon as a cheap subterfuge, as the decorative value of the design depends on the artistic handling of the details, and not on the value of the materials.

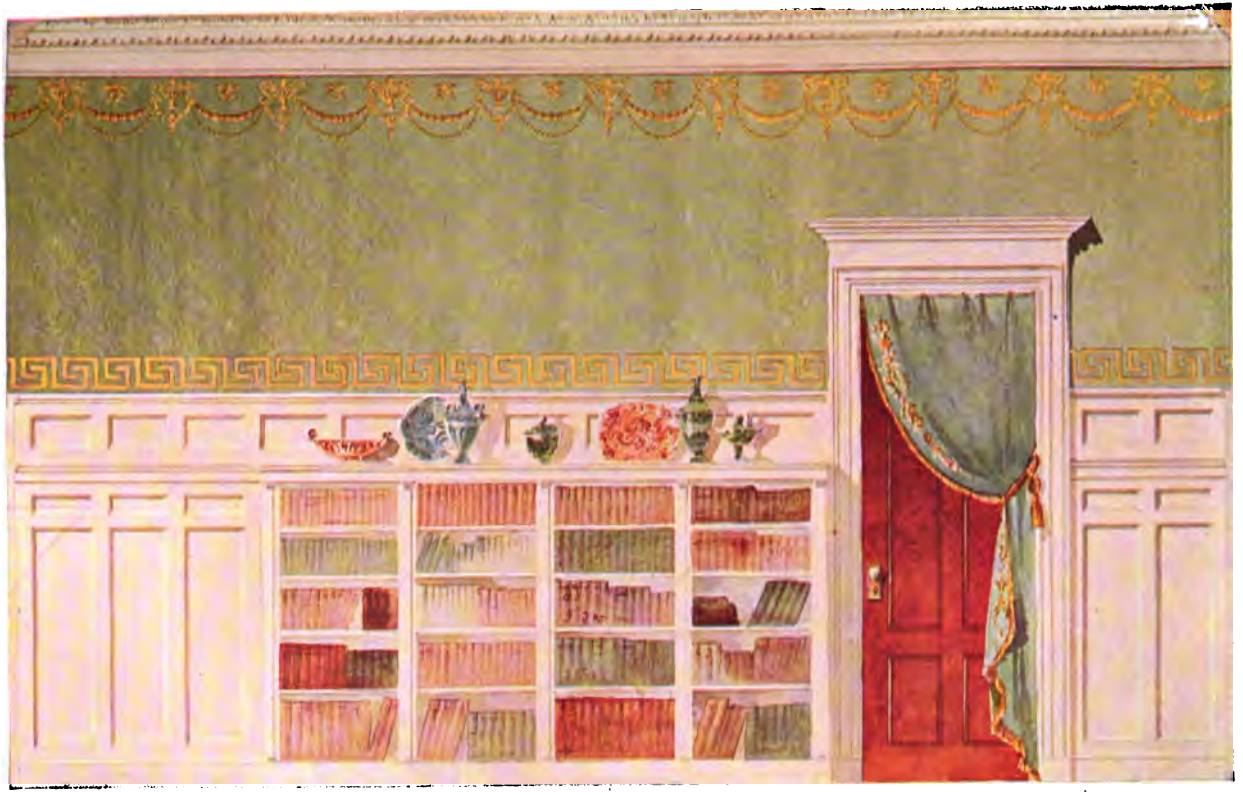
The substitution of quartered oak or mahogany would run the cost up and at the same time require a more elaborate fabric for the panels and frieze. The battens could be treated as pilasters with molded capitals and bases. This would change the character of the projecting shelf and with the other dependent details an ornate and expensive composition would result. Thus, while it can be seen that a simple idea can be worked up as an inexpensive or a costly design, it should ever be remembered that the elaborate composition of pilasters, columns, pedestals, and entablatures should never be attempted with the simple, inexpensive materials. An elaborate design rendered in the most inexpensive materials will always look cheap, while a simple design in the same materials will always appear suitable and proper; and a simple design in expensive material will be dignified and luxurious.

DESIGNING

111. It should be understood from the beginning that designing does not consist simply of drawing, nor does drawing by itself consist in any way of designing. There are many designers that cannot draw well, and a greater number of draftsmen that cannot design successfully. Therefore, the man that can both design and draw has very much in his favor.

In order to work up a scheme for interior decoration it is necessary to have a mental conception of the materials and the treatment that must be given them to suit the conditions of some particular apartment; that is, the subdivision of the wall, the treatment of the wall spaces and openings, the introduction of furniture and accessories, and the color scheme, must exist as a whole in the designer's mind before the drawing is started. The drawing then becomes simply a means of communication by which the designer expresses his idea to others. If the idea can be expressed verbally or in writing, a drawing is unnecessary.

For instance, suppose that a room is to be trimmed around the doors and windows with a 6-inch architrave, that a 9-inch base, all painted white, is to be carried around the four sides, that the walls are to be covered with green burlap, and that a picture molding is to be run 18 inches below the ceiling. No drawing would be required for such a scheme, as it is so simple that the description is sufficient. However, if a room is to be in white enamel, with wooden wainscot half way up, the chair rail $3\frac{1}{2}$ feet from the floor, and bookcases built in the height of the chair rail, these cases to have openings about 18 inches wide, with four shelves each, upper walls to be covered with green ooze leather, stamped in gold, doors to be mahogany, etc., then the description is so elaborate that no idea can be obtained from it, and a drawing or a sketch is necessary. Such a sketch is shown in Fig. 30. This is not a working drawing, but simply a pictorial representation of the decorative scheme.



161 § 49

FIG. 30

112. Drawings for interior decorative designs are of two kinds—*pictorial* and *practical*. The former kind is usually a sketch drawn to scale and rendered in pencil, in pen and ink, or in color, for submission to the owner, or patron, so that he may form an idea of how the scheme will work out. The practical drawings are working drawings made for the craftsmen, so that they can properly carry out the idea. The working drawings for the room shown in Fig. 30 would consist of a set of scale drawings for the woodwork, including full-size profiles of all the moldings, and a drawing to scale of the stamped-leather filling.

The designer should be familiar with the net cost of all the materials that he makes use of, and also with the cost of their decoration and application. The first cost mentioned can be learned only by experience, as the prices vary from year to year and in different parts of the country. A collection of catalogs of all manufacturers of interior-decoration materials should always be on hand, and these should be consulted before any scheme that is limited in price is worked up. The cost of labor can be estimated only from actual knowledge of the time required to execute a certain kind of work.

113. When the designer is called on to prepare sketches for a decorative scheme, whether it be for a few rooms or for an entire building, he should learn at once about how much money the owner proposes to spend for it. He should then subdivide this amount into separate items for each room, according to its importance, and confine his design within these figures. If the owner desires more elaboration, he should at once be informed as to the approximate additional expense, in order that the responsibility for the excess may rest with him and not with the designer. It is a serious mistake for the designer to prepare sketches for a scheme that is far more expensive than the owner desires, and then, after their approval, be compelled either to ask for an additional appropriation or to cut the design down in price and detail in order to carry it out. A reputation for executing

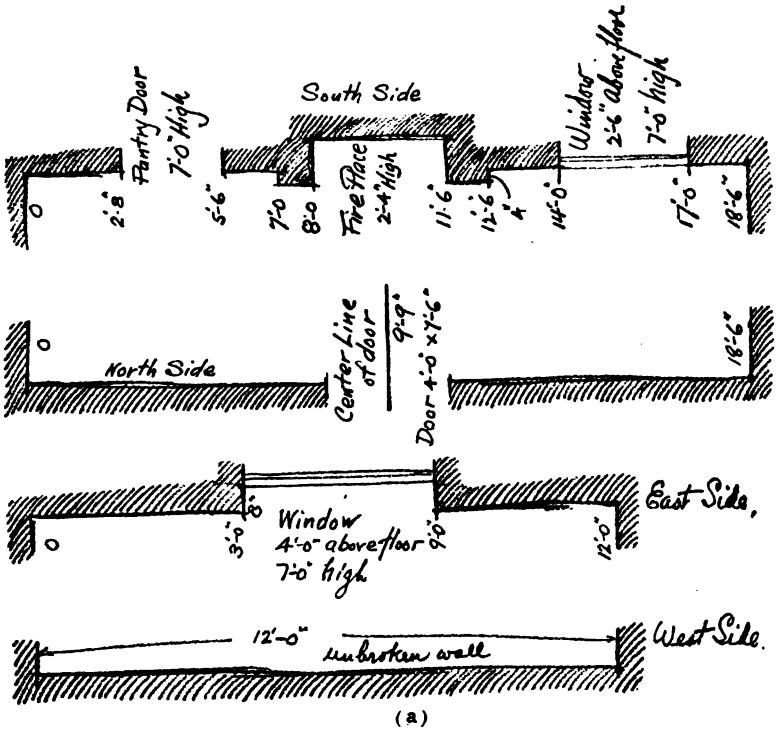
work within the prescribed price will retain patrons for the decorator, whereas an experience to the contrary will cause the patrons to seek another designer when a new job is to be given out.

MEASURING UP

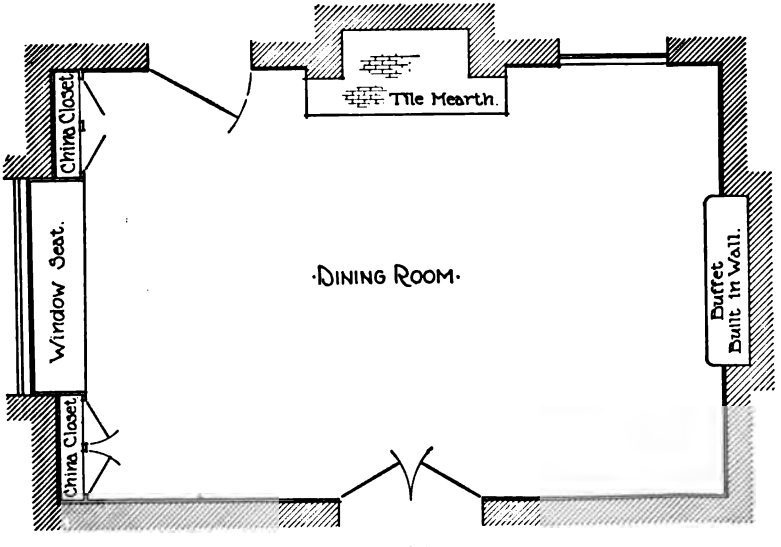
114. The first step after securing an order is to get the exact drawing of the rooms to be decorated. For the preliminary sketch, this drawing may be taken from the architect's plans, but for the working drawings, the building itself should be measured. This is necessary, as many slight changes are made during the process of erection and the finished structure rarely corresponds exactly with the figures on the plans. A variation of an inch is often a serious obstacle.

115. In measuring a room, commence at one corner and measure continuously across the side with a 25- or 50-foot tape, recording each projection or recess as it is reached and noting the width of trim, etc. around windows and doors, where such trim is built in before measurements are taken. Do this with all four sides of the room, and then measure the ceiling height, the size of windows and doors, and the height of the windows above the floor. Make a special note of chimney breasts, fireplace openings, bay windows, location of gas and electric fixtures, water supply, etc. A survey of a single room after such a system of measurement should be about as shown in Fig. 31 (*a*), each side being recorded separately. All measurements of less than 2 feet should be recorded in inches (thus, 16″, not 1′ 4″). Care in the observance of this rule on all occasions will avoid errors in reading the survey after it is made.

116. After all measurements are taken and all information is recorded, a scale plan of the room should be laid out as in Fig. 31 (*b*), and on this plan all the details of the decorative scheme should be inserted. Thus, the china


South Side
Pantry Door
7'-0" High
Fire Place
2'-4" High
Window
2'-6" above floor
7'-0" high
0
2'-8"
5'-6"
7'-0
8'-0
11'-6"
12'-6"
4"
14'-0"
17'-0"
18'-6"
North Side
Center Line of door
9'-9"
Door 4'-0" x 7'-6"
18'-6"
East Side.
Window
4'-0" above floor
7'-0" high
3'-9"
9'-0"
12'-0"
West Side.
12'-0"
unbroken wall

(a)


Tile Hearth.
China Closet
Window Seat.
China Closet
·DINING ROOM·
Buffet
Built in Wall.

(b)

FIG. 31

closet on each side of the east window and the buffet built in the west end of the room are shown, together with the tile hearth in front of the fireplace.

The side walls of the room can be drawn to scale in the same way, preferably on water-color paper or bristol board, so that they can be rendered in color or in line when finished; or, the elevations can be sketched in pencil on detail paper, and when all the details and alterations have been decided on, they can be redrawn on finer paper for rendering.

It affords excellent practice for the beginner to measure up the rooms of his own house, and, after drawing them to scale, to render them in color for some decorative scheme. In fact, several schemes should be tried. The wall space with its door and window openings should be drawn out to scale on brown detail paper and then with a sheet of white tracery paper laid over, a decorative scheme can be worked out. The trim of the door can be altered to introduce a pilaster and entablature effect, and the panels can be rearranged accordingly. The same may be done with the windows, and a leaded- or stained-glass treatment introduced in the sashes. The walls may be paneled or wainscoted with a dado and additional pilaster treatment like the doors, and the frieze and field may be enriched harmoniously with the style or period. Again, a plain batten treatment may be carried out on the walls, and the door and window trim made to harmonize with it in simplicity. Portières may be introduced instead of doors, and suggestions of tapestry, leather, stencil, or other treatment introduced into the panels. Various color schemes on the same general structural design should be practiced, as much will depend upon the color effect of the completed representation. In doing this the student should carry a mental idea of everything he is to introduce —what kind of wood he is to use, what way he will treat it, what fabrics are intended in his representations, etc., so that he could be prepared at once to carry out the idea just as he had planned.

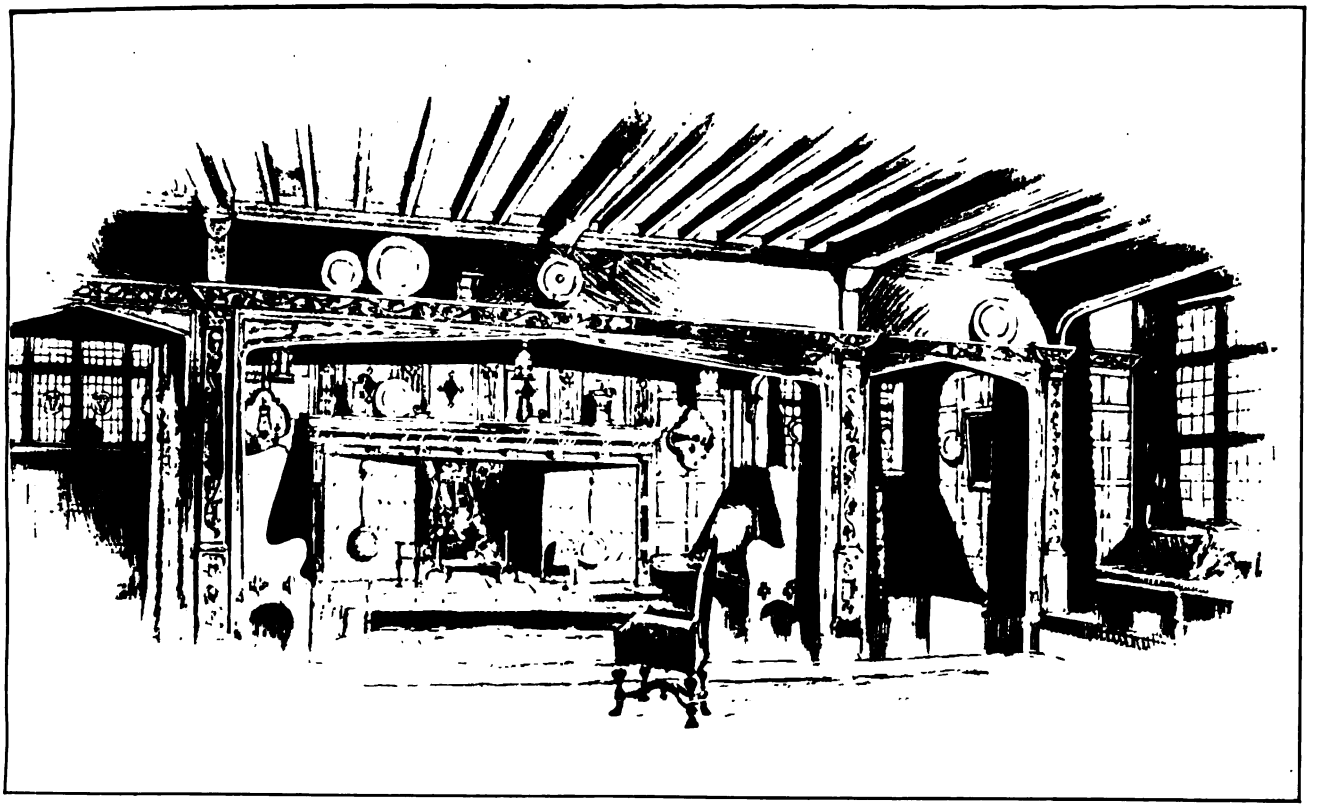


Fig. 32

RENDERING THE DRAWING

117. With the decorative scheme all laid out in pencil, the drawing is ready to be rendered. This may be done in *pencil*, in *pen and ink*, or in *color*. Pencil work is usually chosen for rough, sketchy renderings, as in Fig. 32, where the details have not been entirely worked out, although, in

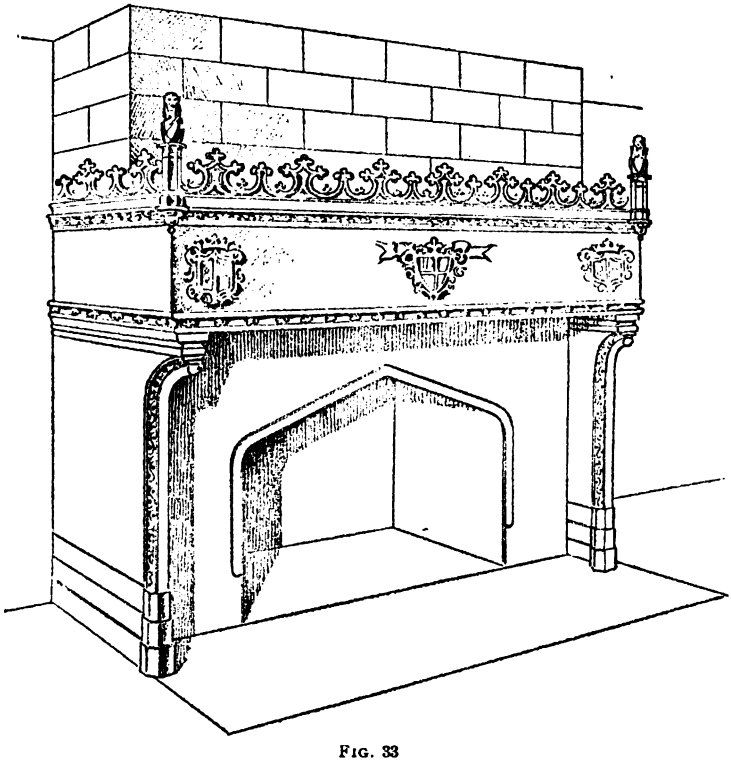


FIG. 33

some cases, a piece of furniture or a mantle can be rendered very satisfactorily in pencil and at the same time be made to show very clearly the details of the carved ornament and moldings. In Fig. 33 is shown a design for a stone mantle that was rendered entirely in pencil. Here, all the details are sharply outlined, and they show up to their full value.

(*a*)

(*b*)

FIG. 34

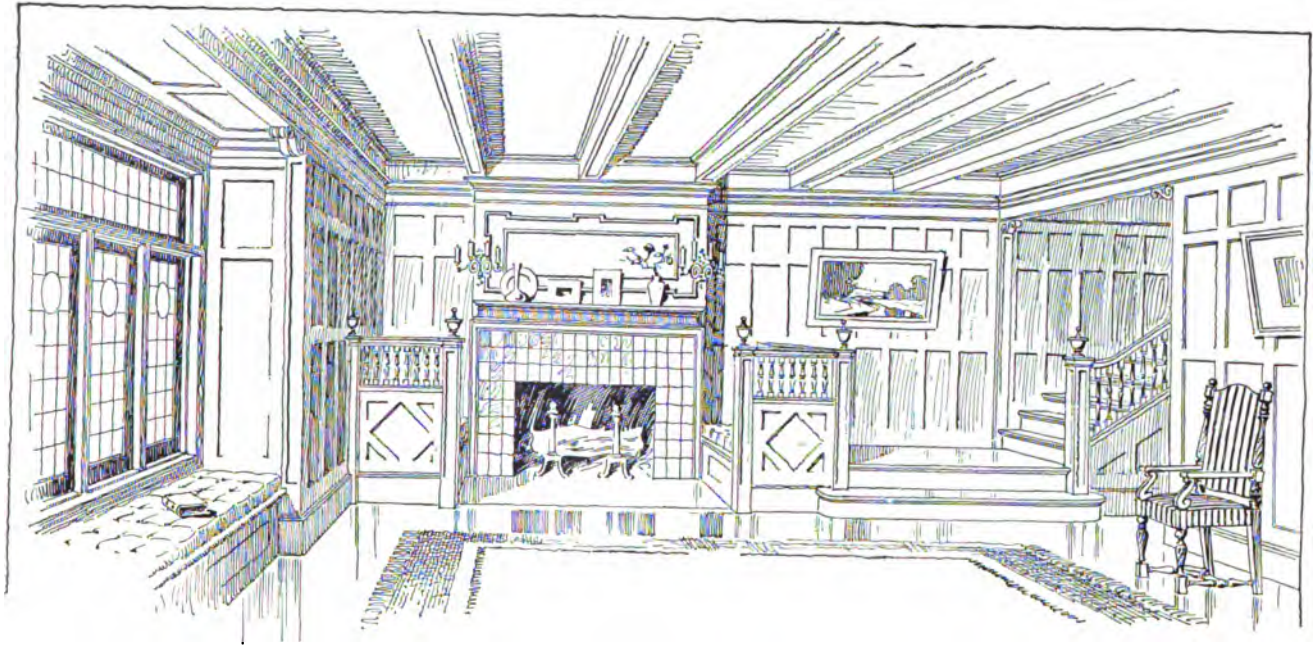


FIG. 35

This design was laid out in perspective with instruments, and then the details were drawn in with pencil. There being no color scheme to exhibit, the pencil design is perfectly satisfactory.

118. Where there is to be a decorated spandrel or a frieze panel, as in Fig. 34 (*a*), the sketch of it may be laid out in pencil on the preliminary drawings, with the shaded sections worked up as in (*b*), but it is not necessary to carry out the entire color scheme as it is to appear when finished. In fact, the designer rarely has the designs for the decorative paintings selected when the preliminary sketches are completed, and a sketch that is as detailed as the one shown in Fig. 34 (*b*) is not necessary. All that is usually required is that the general governing lines of a decorative scheme be laid out so as to indicate the idea; after this, the scheme itself can be worked up to suit the conditions.

119. Pen-and-ink work is used mostly where the designs are to be reproduced for illustrations. In Fig. 68, the examples of Louis XV and Empire furniture are rendered in pen and ink, the characteristic ornament being clearly shown in outline, although the color value is lost by this method of rendering. Stronger effect could be obtained by the use of color, but this is hardly necessary in furniture design, as the upholstery goods can usually be shown separately, and of course a better idea can be obtained from the material itself than from any sketch of it in color.

Pen-and-ink outline interiors, as shown in Fig. 35, can also be made attractive either as submission sketches or as illustrations.

120. Water color affords the simplest means of giving a pictorial idea of a decorative scheme, and it is the medium most frequently used. The renderings are made in plan elevation or in perspective, as the case may require, but for general sketches the plan of a ceiling or the elevation of a side wall can be made to suit all the requirements, and perspective drawings need be resorted to only when demanded by elaborate and expensive schemes. The examples that

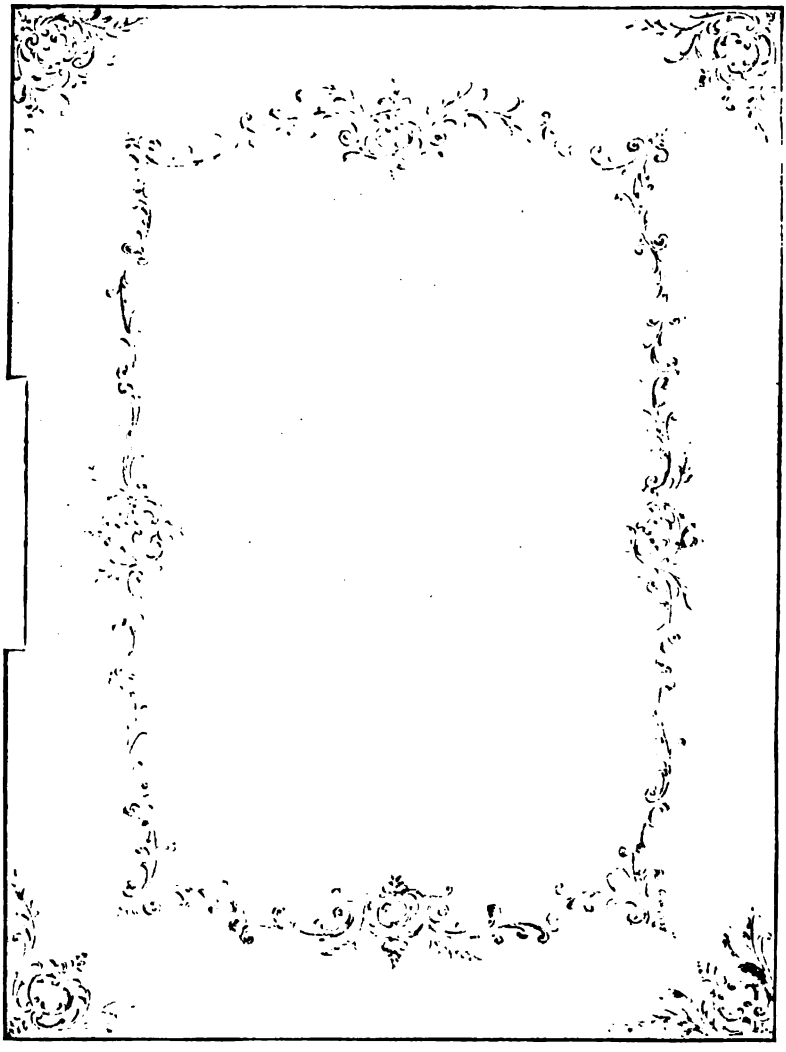
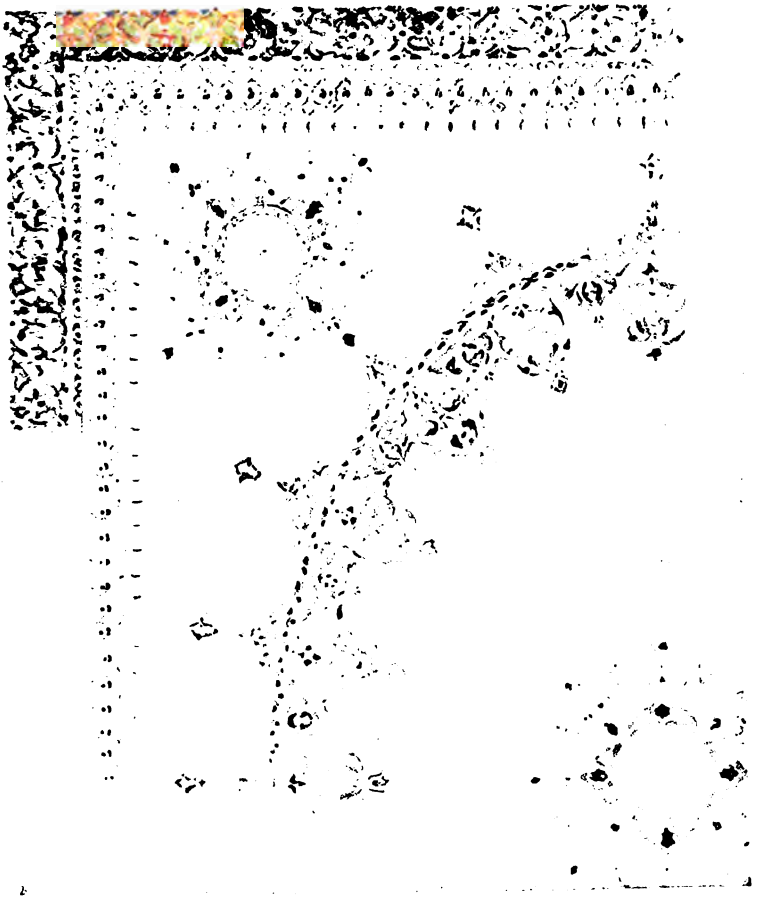


FIG. 36



161 § 49

FIG. 37

follow show the rendering of schemes of design and color effect for interior decoration.

121. In Fig. 36 is shown a plan for a simple Louis XV ceiling. In order to design a ceiling similar to this, it will first be necessary to measure the size of the room, and then draw the plan of the ceiling in pencil to a scale of $\frac{3}{4}$ inch to the foot on ordinary detail paper. The governing lines of the central rectangle should then be sketched in and altered and redrawn until the form is satisfactory. After this, the branching scrolls should be drawn in, and finally the corner ornaments. This completes only the rough sketch, but when this is satisfactory, a piece of tracing paper can be laid over it and either one-half or one-quarter of the design carefully traced off, to be transferred finally to drawing paper or to bristol board. The outline of the plan of the ceiling should then be carefully drawn in pencil on the bristol board or the white drawing paper, and the tracing reversed and laid over it, pencil side down. With another pencil (about H B grade), the outline of the design should be carefully gone over, so as to transfer the pencil design from the tracing to the final paper or the bristol board. This should then be repeated either two or four times, according to whether one-half or one-quarter of the design is traced off, until one-half or all of the design is completed. The finished drawing should then be worked up by judicious touchings with a soft pencil here and there, and, finally, the color should be laid.

A flat, even wash should be carried from the upper left corner to the lower right corner, and when this is dry, a darker wash should be touched in under the ornament so as to give it relief. A few strong touches of soft pencil and a few highlights put in with Chinese white will complete the design. When carried out in this manner, the work is extremely simple, while the result is sharp and pleasing. No colors are used, yet the full effect is attained in monochrome.

122. In Fig. 37 is shown the rendering of a design for an Oriental ceiling, but owing to the complications of the design only one-quarter of it is drawn. In order to render a

design like this, the outline should be laid out in pencil, as in the preceding design, and the main structural lines then sketched in on the preliminary drawing. The lines of the molding forming the border should be drawn in with the T square and triangle, and the elliptical centerpiece contoured mechanically after its length and breadth have been determined. The circumference of the ellipse having been divided into an even number of parts, the ornamental section of each part should be roughly sketched in a number of places until a desirable form is obtained. After this, the main structural lines should be traced and then transferred, as in the previous case, but the details of the ornament should be worked up separately and then each traced and transferred by itself.

In a preliminary sketch of this character, it is not desirable that every detail of the decoration show up distinctly, but rather that the general effect be depicted and the color scheme as a whole be brought out. The latter can be accomplished by laying a flat wash of burnt sienna over the whole design and then overlaying the stronger colors on the dry wash. After sketching in the outlines of the ornament with light touches of a brush charged with a deeper tone of burnt sienna, the jeweled effect can be obtained by distributing the minute spots of red and blue so as to produce the desired general effect.

123. The treatment shown in Fig. 38 was for the dining room of a house built at Saratoga, New York, the same room that is shown in Fig. 31. The woodwork was 4 feet 5 inches high, and of clear, white pine enamel-finished in cream white. Above this woodwork the wall was decorated with a modern imitation of French tapestry. The drawing was carefully laid out in pencil and the woodwork lightly washed over with the weakest possible tint of gamboge, to which a little burnt sienna was added occasionally to vary the monotony of the flat tint. The cast shadows and shaded portions were then indicated with a pale wash of Prussian blue and crimson. The tapestry effect was first sketched in

161 § 49

FIG. 38

pencil, and then all was lightly washed in with yellows and browns, as shown at the right. Then, at the left, the design was worked up stronger with local color so as to show the detail. The lead work in the windows was penciled, with only a touch here and there of light blue to give the feeling of transparency. The effect of the cut glass in the cabinet at the right was produced with crimson, but the utensils in the cabinet at the left needed higher coloring, owing to the stronger effect in the tapestry above them.

This is a characteristic sketch for a scheme of decoration, and shows precisely how much of a drawing should be finished up and how much of it should be left in a sketchy, unfinished condition. The original design was drawn to a scale 1½ inches to the foot and it measured 14 in. × 18 in.

124. The treatment shown in Fig. 30 was for the sitting room and library of a house at Newport, Rhode Island. The bookcases are 3 ft. 3 in. in height, and the wainscot extends 9 inches above them. In the sketch, they are tinted with a very pale wash of burnt sienna and charcoal gray, while the shadows are cast with a deeper wash of the same colors. The highlights are indicated with Chinese white, used mostly in a ruling pen. The egg-and-dart treatment in the cornice was effected by tinting the entire cornice to match the woodwork, and then contrasting the highlights and shadows on each egg-and-dart detail with Chinese white and deeper wash. Pencil lines do not play an important part in this sketch. The drawing was made to a scale of 1½ inches to the foot, and measured 12 in. × 18 in.

The upper wall was of green ooze leather, which was stamped in gold at the top and stenciled at the bottom. The door was of mahogany, with gold-plate fittings. To secure an effective treatment in this sketch, the coloring of the books and the bric-à-brac had to be varied and interesting. The monotony of an unbroken stretch of white woodwork half way up the wall would have created a bad impression on the person considering the design. As it is, however, this monotony is destroyed by the well-chosen variety of

tones in the books that balance so well the rich mahogany of the door.

125. Fig. 39 shows a broad and simple treatment of white woodwork setting off three doorways of leaded glass. The wood trimming and cornice in this design were sketched in broadly, but carefully, with pencil, and the cast shadows were indicated with a pale neutral tint and crimson. Three designs for the leaded-glass treatment were carefully worked out in pencil and then colored up somewhat highly to get contrasts. Greens and brownish yellows characterize the general tone of the whole design, while stronger greens, contrasted with oranges and reds, emphasize the details. This illustration shows how effective a drawing can be made no matter how simple its details may be. The scale of the original drawing was $\frac{3}{4}$ inch to the foot, and it measured 10 in. × 16 in.

126. Fig. 40 shows in a single sketch the side wall, fireplace, and ceiling treatment of a small dining room. The wainscot is paneled in dark oak, and the top of it extends out and is supported on heavy iron brackets to form the mantle shelf. The chimney breast is executed in Dutch tiles of various designs. The upper wall is treated in water color, with an armorial device over the mantle. The ceiling is beamed with tinted plaster in the panels. The woodwork is rendered in burnt umber, with the highlights in Chinese white, while the side wall is in cobalt blue and neutral tint and the ceiling in burnt sienna and yellow ocher.

This is a very inexpensive and simple treatment, and is suitable for a variety of purposes. The style is distinctly German and is suggestive of a Tyrolean café.

127. In the design shown in Fig. 41, the pilasters were washed in with Vandyke brown, to which a little umber was added so as to vary the monotony of tone, and the moldings were drawn with a ruling pen filled with a darker color. The wall was then washed over with Indian red and crimson, and the pattern in the upper part drawn in Chinese white and a tint darker than the background.

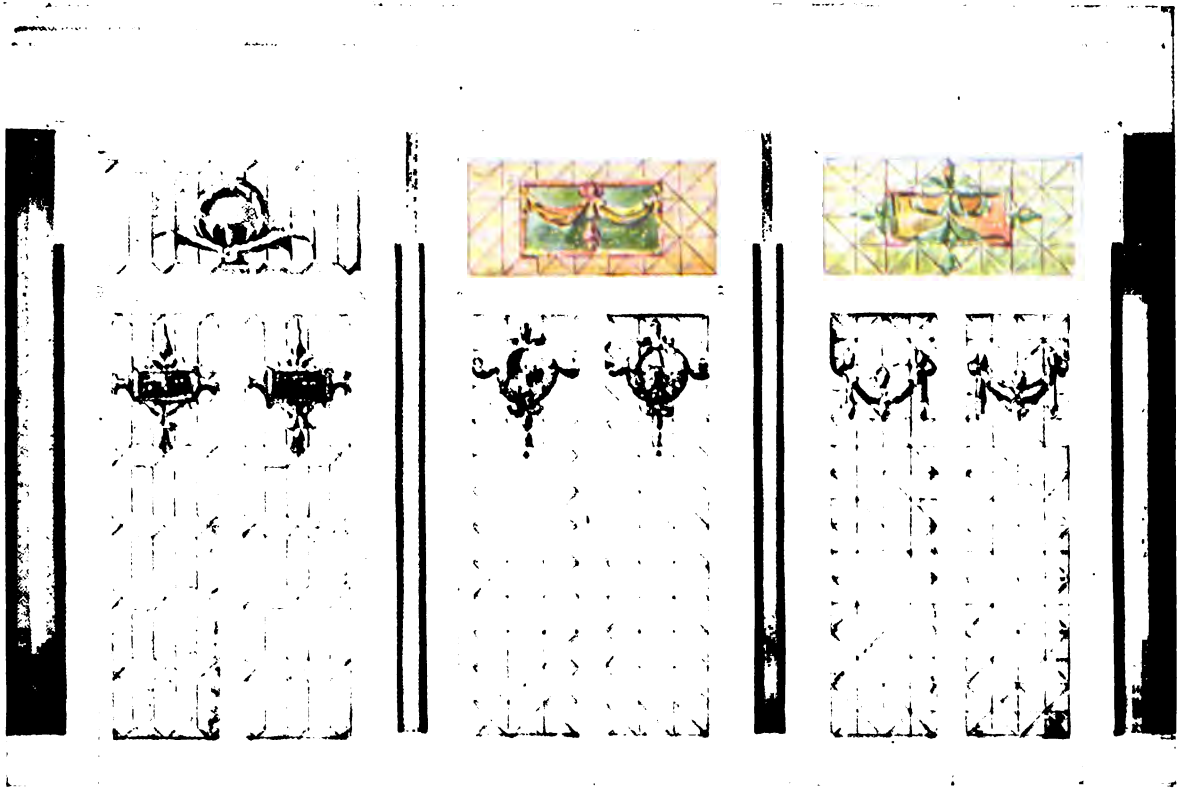
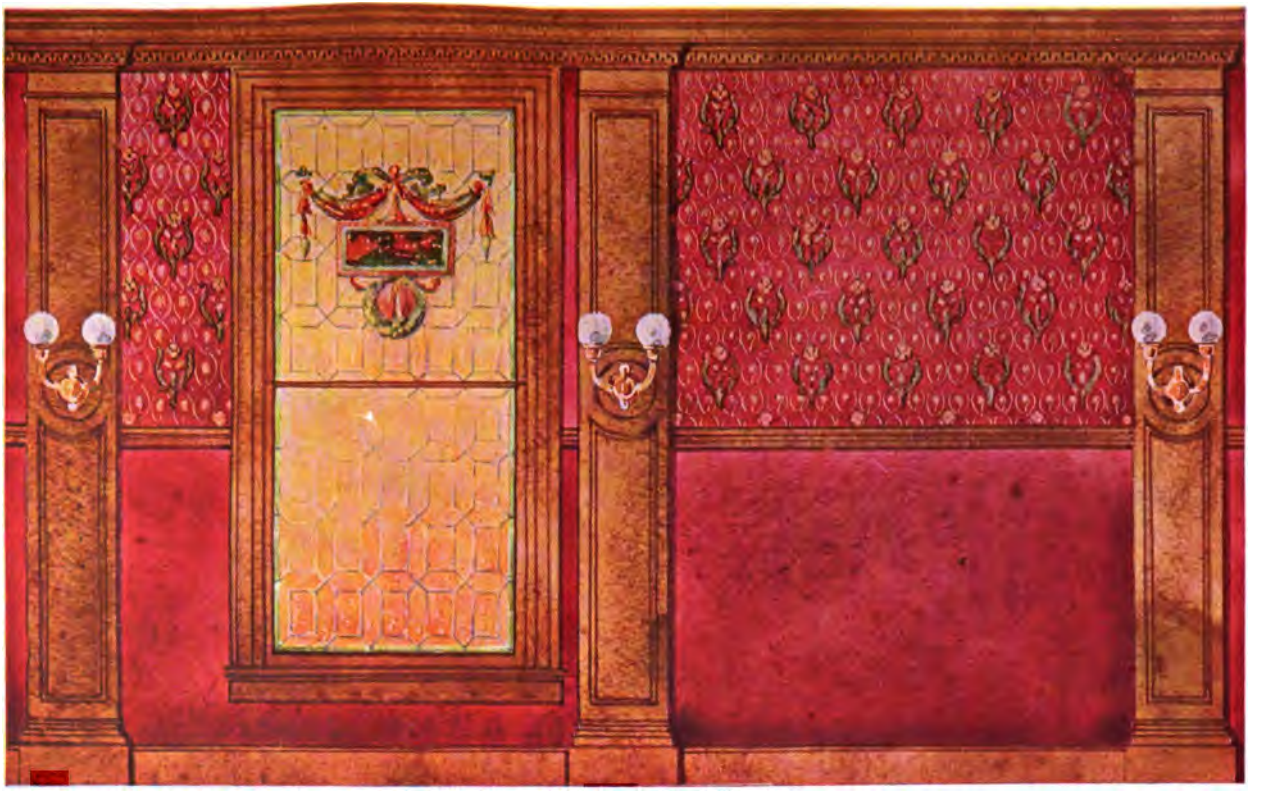


Fig. 39

161 § 49 FIG. 40



161 § 49

FIG. 41

HISTORIC STYLES AND PERIODS

128. The decorator and designer should be familiar with every style of architectural design and also with every period. **Historic style** pertains to the architecture of a nation, or country, during the entire time that that nation existed. Thus, the Egyptian style, the Greek style, etc., mean the characteristic styles of these countries, while the Gothic and Renaissance styles pertain to the architecture of all Europe, in contrast to the architecture of Western Asia and Northern Africa, which was practiced at the same time. Gothic architecture was inspired by a uniform religious movement that affected all civilized Europe, while Moslem architecture was inspired by another religious movement that at the same time was affecting Western Asia and Northern Africa.

Period decoration consists of the characteristics of particular periods of a style; as, the Louis XVI period of the French style, the Elizabethan period of the English style, etc.

129. Buildings are usually built in a certain style of architecture, while the rooms are decorated in several different periods of that style. Architectural styles can be learned only by close study of the various influences that have characterized each country, and to comprehend the different periods of each style properly, knowledge must be had of the social, political, and religious conditions that caused each particular period to exist. Therefore, in making modern designs in accord with some historic period, the conditions of each case will determine very largely what period is best suited. The discussion of a few applications of historic styles and periods will assist in the gaining of a knowledge of the harmony that must exist in the style of decoration and purpose of a room.

FIG. 42

EGYPTIAN STYLE

130. The vast difference between the conditions of the civilization of the ancient Egyptians and that of modern Europe and America renders Egyptian architecture and

FIG. 43

decoration of little use in modern buildings, but occasionally, with a few alterations, it finds an appropriate place, as in one of the lodge rooms of the Masonic Temple, at Philadelphia, as shown in Fig. 42,

FIG. 44

The effect of this style of design is solemn and impressive and thoroughly in keeping with the mysterious rites of an ancient secret society. Note the emblems that have been worked into the decorative details of the wall panels, altar fronts, chair backs, etc. All is in perfect harmony with the Egyptian style and at the same time in keeping with the purpose of the room. There is scarcely an element of Egyptian ornament that does not find a place in this decorative scheme, and when seen in the full glory of its color effect, it is magnificent and imposing.

131. In Fig. 43 is shown the elevation of the entrance to the Egyptian Room in the Crystal Palace, England. This palace is a museum, and the British government has erected therein rooms in different styles of architecture for the benefit of art students and historians. The example here shown is worked out as purely Egyptian as possible from historic writings.

GREEK STYLE

132. The Greek civilization presented many details more in harmony with modern ideas, and although the Greek buildings were small and not suitable for modern purposes, the style of decoration is to be found in an adapted form in many modern buildings. The characteristic Greek building was Doric architecture, but the Greek Doric column is so short and thick that it does not lend itself readily to modern ideas. However, the characteristic types of ornament enter readily into modern surface-decorative schemes.

ROMAN STYLE

133. Roman civilization was the foundation of many of the modern customs, and although the Roman styles are not followed with exactitude, they are, with slight alteration, found in many of the later Renaissance designs. Fig. 44 shows the Ionic room in the Masonic Temple previously mentioned, and although the columns and capitals are

FIG. 45

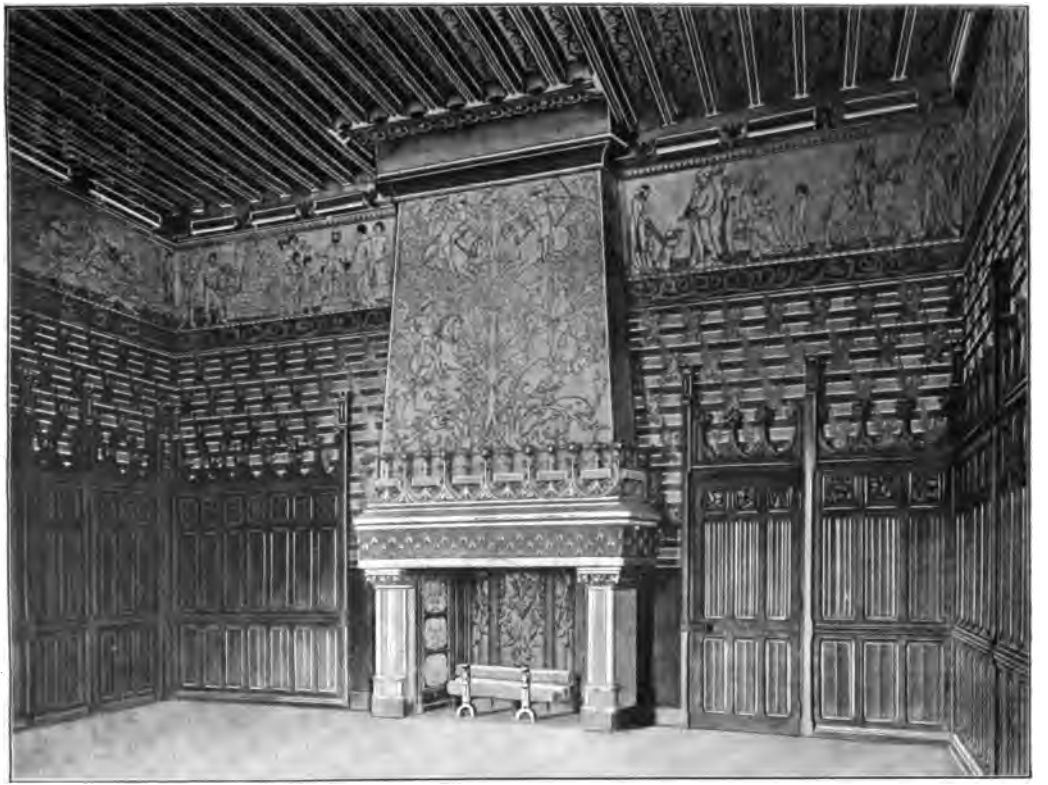


FIG. 46

modernized Roman, the decorative details are purely Greek, or as nearly so as modern conditions will admit. The introduction of the portraits in the wall panels detracts materially from the classic effect, and the details of the furniture are not so characteristic as were the examples in the Egyptian room; nevertheless, the effect is carefully studied, and the subdivision of the wall gives loftiness and dignity to the apartment.

CORINTHIAN STYLE

134. The Corinthian room of this same temple is shown in Fig. 45. This room is far richer in effect, owing to the greater possibilities of the Corinthian ornament. The pediment over the chair at the end of the room adds dignity and impressiveness to this part of the composition, and is a feature that was lacking in the previous design. The wheel-and-star forms in the vault spandrels and the shell tops in the niches, are more Gothic and Renaissance than Roman, but the whole is an excellent adaptation to the purpose.

GOTHIC STYLE

135. With the Gothic period, an entirely new scheme of interior effect was produced, owing to the importance that residence architecture assumed in connection with the feudal system of government, religious zeal, and chivalry. Woodwork assumed an important position in building and a combination of carved stone, painted walls, and wood paneling characterized the interiors.

In Fig. 46 is shown a sleeping apartment in the Château Pierrefonds, the walls of which are of decorated plaster with characteristic wood paneling and decorated ceiling beams. The mantle is of carved stonework decorated above with conventional scenes from the hunt.

136. In Italy, where stone was more abundant, woodwork was not so much used. In the interior shown in

FIG. 47

(*a*)

(*b*)

FIG. 48

FIG. 49

FIG. 50

Fig. 47, a diaper treatment is worked out on the side walls and vault soffits, with a frieze of shield forms decorated with coats of arms, crests, and other heraldic devices. The mantle is simpler and more classic in molding, as is also the door trim. The furniture, however, does not belong to this period, but to the late Renaissance.

A similar, but more symmetrical treatment, is seen in the modern decoration of the crypt of the church of St. Chapelle, in Paris, Fig. 48 (*a*). A simple diaper pattern ornaments the soffits of the vaults with a border, while the columns are stenciled with small heraldic forms.

137. In the great hall of Warwick Castle, in England, Fig. 48 (*b*), the walls were left in their original stonework, but were relieved with antlers, pieces of armor, etc., while cases along the walls contain the armor, shields, lances, etc. of the old feudal owners of the estate. This illustration shows the apartment as it appears today, so that the rugs, furniture, and other accessories belong to a later period.

138. The bare walls of Gothic interiors were frequently hung with tapestries during the later periods, and these also form an important decoration during the early Renaissance. A simple adaptation of the Norman period of English architecture is shown in Fig. 49, which is another of the lodge rooms of the Masonic Temple, in Philadelphia. Every detail of furniture, floor covering, and ceiling decoration is in absolute harmony with the style. Such modern improvements as electric lights and fixtures are difficult to combine with the crude old architecture of the 12th century, but it has been effected here by casing the three altar lights with specially designed globes, in the form of torch flames, and mounting them on standards of characteristic design. The decorative historic figures in the wall panels practically prevent the introduction of modern paintings in the lodge room, and thus tend to preserve the character of the room.

139. The Gothic hall shown in Fig. 50 is not so successful as the preceding example, as the broad, unbroken wall spaces invite pictures or other details to break the monotony,

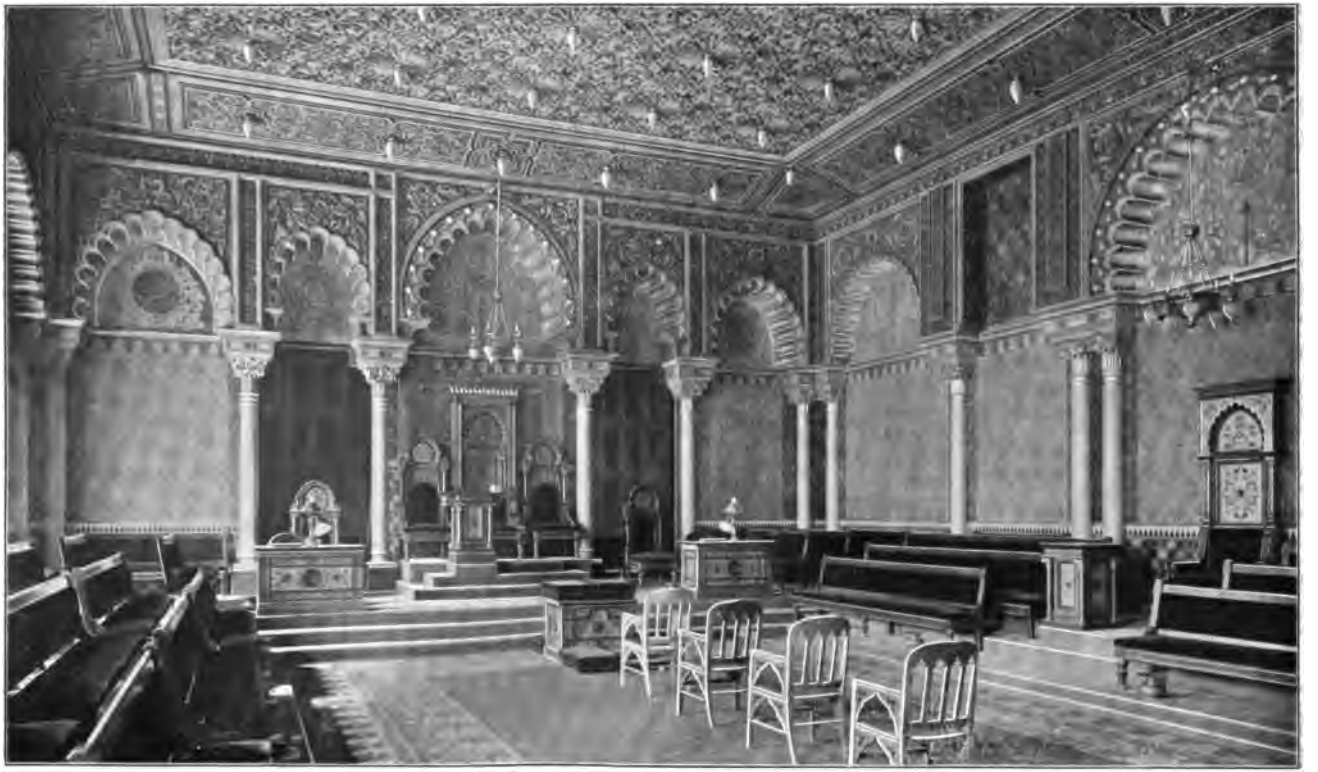


FIG. 51

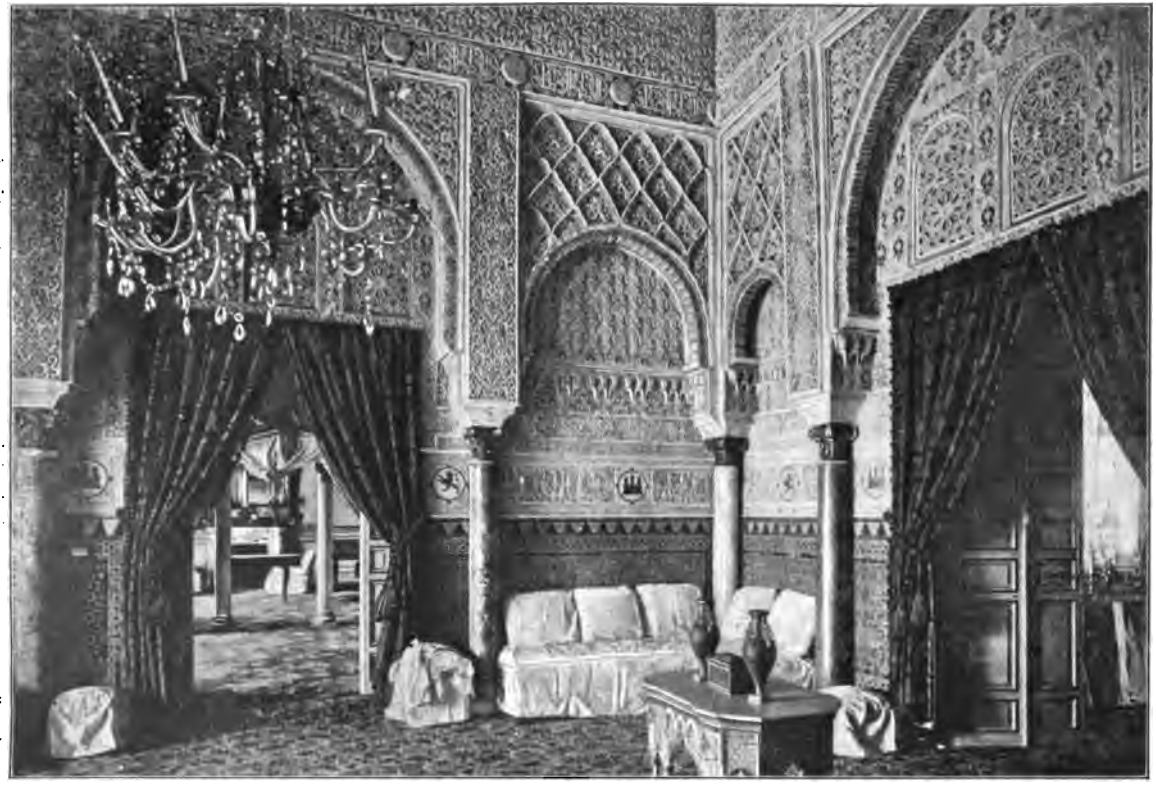


Fig. 52

and the harmony of the surroundings is at once destroyed by the ugly gilt frames of florid ornament extending far up into the soffit of the vault. The furniture here is well worked out in the late English style of tracery, but the doors and the moldings lack character and interest. How much more effective this room would be if it were paneled and decorated the same as the room in the old Château Pierrefonds, Fig. 46. There would then be no chance to deface the panels with modern portraits, and the spirit of the medieval craftsman would pervade the design.

MOORISH STYLE

140. Happier in this respect is the Moorish interior shown in Fig. 51. The beautiful diaper in its rich coloring (see *History of Architecture and Ornament*, Part 3) fills the entire room space, while in the intricate geometrical ceiling, the electric-lighted pendants harmonize perfectly with the design. Compare this interior with the apartment in the Alcazar, at Seville, Fig. 52, which was originally built over five centuries ago, and observe how completely the scheme has been adopted and how well it suits the conditions imposed. The fittings of the Moorish palace are somewhat more luxurious than those of the lodge room, but this would naturally be the case, as one is the abode of an ancient monarch, and the other the gildhall of a modern society of craftsmen.

RENAISSANCE STYLE

141. With Renaissance architecture is reached a stage that is distinctly period decoration. Gothic Architecture was divided into three periods in all countries (see *History of Architecture and Ornament*, Part 3), but these periods were periods of development of construction regardless of social or political influences, while the periods of the Renaissance reflect the characteristics of individual reigns and are under social and political influences almost entirely.

Fig 53

ITALIAN RENAISSANCE

142. In Italy, there were three schools, or systems of design in the Renaissance, due to the dominant influence of certain architects in certain cities (see *History of Architecture and Ornament*, Part 4). The decorative motifs, however, did not present so wide a difference. The structural forms were essentially classic, owing to the proximity of ancient Rome and the wall spaces, vaults, soffits, spandrels, and pier fronts were entrusted to the painter on which to lavish his skill. It is therefore not to be wondered at, that, with her great wealth and with such artists as Michelangelo, Raffael, and their contemporaries and successors, the mural decorations of the Italian Renaissance were the finest in Europe.

143. Michelangelo's chief work was the decoration of the chapel in the Vatican. This work represents the "Story of Genesis," and covers the entire ceiling and side walls. It occupied 4 years of the artist's time.

Raffael painted many panels in the rooms of the Vatican, but executed no single work so extensive as the frescos in the papal chapel. These pictorial wall decorations became characteristic of the Italian style. In Fig. 53 is shown the Vatican Library, every inch of the walls of which is covered with elaborate mural paintings in historical portraits, religious scenes, and intricate arabesques. The amount of work represented here is stupendous, and the color effect is so rich as to be bewildering. The groin ribs of the intersecting vaults are not emphasized here as in Gothic work, but the soffits are subdivided into square and crucial panels to contain portraits and allegorical pictures, while the field space is elaborated with cupids, mythical animals, and arabesques (see *History of Architecture and Ornament*, Part 4).

144. Where the barrel vault was used over an apartment, a continuous decorative scheme was carried out, as in the Riccardi Palace, at Florence, Fig. 88. Here, flat pilasters divided the side walls into panels under an elaborate baroque frieze, and the panels themselves were decorated

with paintings or elaborate arabesque designs in relief. The ceiling was painted with an allegorical scene, so composed that the darker portion of the design should lie next to the frieze and generally lightened in tone toward the crown of the vault, thus giving an impression of lightness and height.

Italian Renaissance interiors were also designed in marble and rich stones, where painted wall decorations played little or no part, and these designs were carried out in a formal classic manner, precisely in accordance with the rules of Vignola.

145. During the Renaissance, the furniture design followed the style of the decoration, as did embroideries and tapestries. Elaborate carvings in wood characterized much of the panel work, and these carvings extended also to the movable furniture of the rooms. During the Gothic period, furniture was designed more for strength and utility than for comfort. Chairs consisted of hard, flat seats and perpendicular backs that reached far above the shoulders, and sometimes possessed a canopied top. The backs and arms were elaborately carved in traceried panels, but there was no upholstery and no inclination of the seat or back to add to comfort.

146. The beds were similar to the modern designs in form, but in the previous period were built in as a part of the house, somewhat like a horizontal shelf in the wall, over which curtains were hung. Later, the bed, though still a fixture, was placed in a corner or against a side wall, and posts were erected on each side at its end, to carry curtains that could be drawn around it and thus hide it from view. Finally, the four posts of the bed were carried up to form supports for the curtains that enclosed it on four sides and the bed became a piece of movable furniture. These posts, at first plain and severe, gradually became ornamental details that were either carved with tracery or treated in a manner similar to the small gabled buttresses that flanked the masonry walls.

With the Renaissance, the bedsteads became a part of the decorative scheme of an apartment. The four posts became

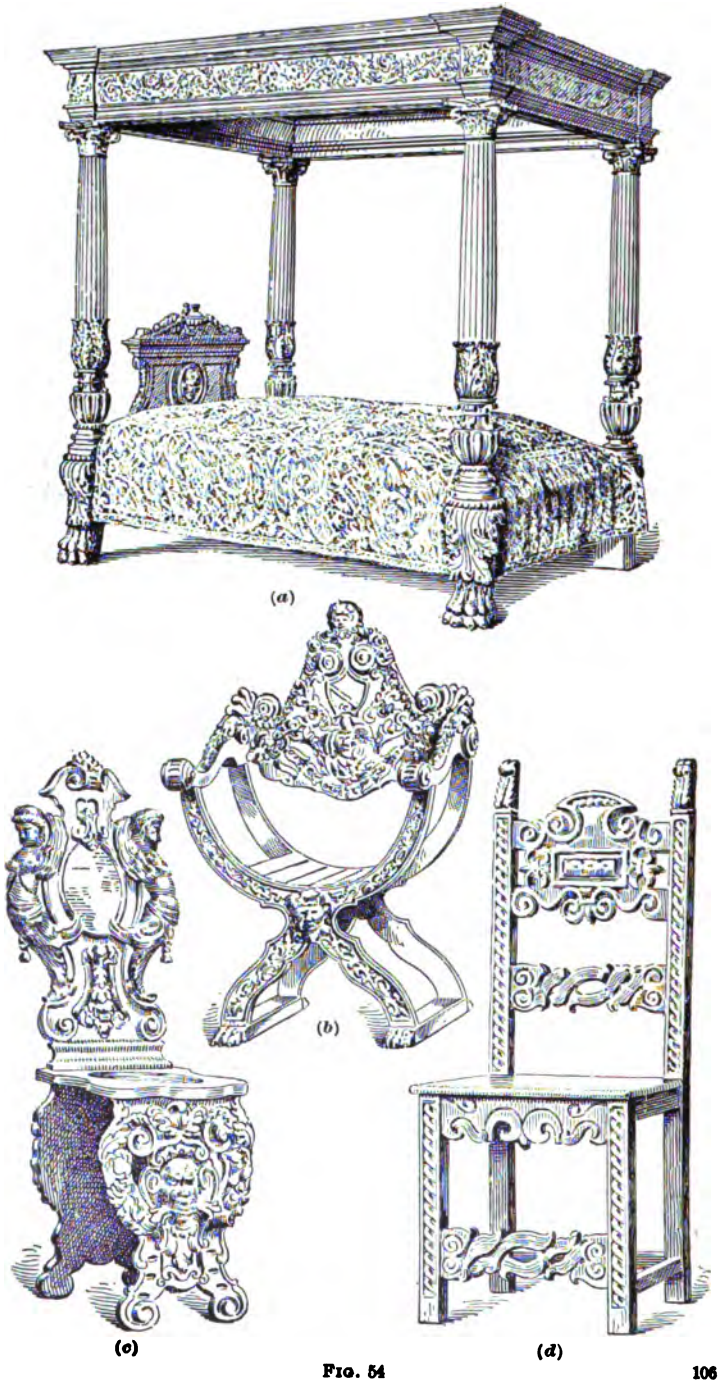
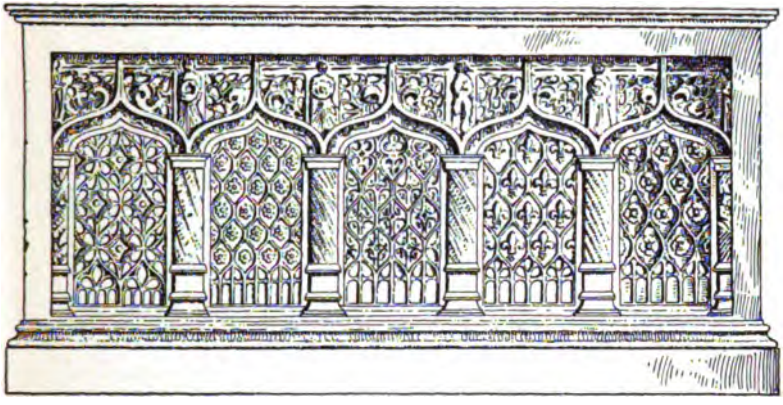
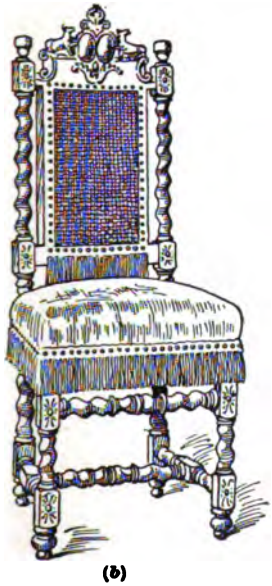


FIG. 54



(a)



(b)

(c)

FIG. 55

classic columns, the curtain rods were concealed behind an entablature, and a rich embroidered coverlet was spread over the linen. In Fig. 54 (*a*) is shown a typical Renaissance design of a 16th century bed, while in (*b*), (*c*), and (*d*) are shown some chairs of this period. None of these chairs is particularly comfortable to sit in, but every available space except the seat is richly carved in accordance with the ideas of the Renaissance style.

FRENCH RENAISSANCE

147. Renaissance architecture was introduced into France during the reign of Louis XII, when Gothic architecture was on the decline, but while Gothic forms were still strongly fixed in the art of the country. The grandeur of the classic style pleased the French patrons greatly, but the French designers, while adopting the Italian details, could not forget their Gothic traditions. Consequently, the classic forms were simply introduced decoratively, and all relation of these forms to structural conditions was ignored in fitting them to Gothic conditions. Wood paneling was retained on side walls, as in the Gothic period, but the pointed panel tops and carved diaper work, such as shown in Fig. 55 (*a*), gave way to simple rectangular panels of classic severity or were decorated with Italian arabesques.

Tapestries still covered the bare stonework above, for the great wall decorations of Raffael and Michelangelo at Rome were not yet finished. Carved chairbacks, wainscots, wall cupboards, etc. no longer presented crockets and quatrefoils, but showed symmetrical scrolls, wreaths, garlands, etc. In fact, the same characteristics of carved wall decorations existed inside as outside (see Fig. 39, *History of Architecture and Ornament*, Part 4). The walls were subdivided into panels and carved in arabesques and spindle forms similar to the stone panels outside. Stamped leather was used to fill some panels, or it was covered over the walls entirely, with decorated ceiling beams above. Columns and spindles became fluted and frequently took a long, attenuated vase

FIG. 56

form, or a combination of several vase forms one above another. See Fig. 56.

148. Flat pilasters were planted against the walls to divide it into panels, but instead of fluting the faces of these pilasters as in the classic orders, they were paneled and richly carved in arabesque. These arabesques were composed of scrolls and foliations, into which were introduced grotesque and mythical figures borrowed from the Italian style. Dancing cupids bearing wreaths enclosing medallion portraits were introduced into the friezes, which were widened beyond all proportions of the classic style. These same characteristics were carried out in the furniture.

149. Francis I Period.—In Fig. 56 is shown a bed of the Francis I period, the supports at the foot of which are carved in a series of superimposed vase forms surmounted by a fluted column. At the head, two Roman warriors support the cornice like caryatids, and the cornice, while pretending to be classic in character, is composed of few moldings, and its upper member is supported on Gothic corbels on an unusually wide frieze. It is evident that the ideas here expressed were derived from a design similar to that shown in Fig. 54 (*a*), but with no understanding that these classic forms were fixed and unchangeable by the rules of Vignola. The forms here are graceful and delicate and far more suited to their purpose than the heavy architectural details of the Italian design. The chairs used by Francis I were at first straight-backed, as in Fig. 55 (*b*), and upholstered on the seats. Later, the backs were inclined, so as to add to comfort and were also upholstered, as in (*c*).

150. Periods from Francis I to Henry IV.—From the Francis I period to that of Henry IV, the tendency to classicism increased. French artists studied under Italian masters, and the richness of display increased as the wealth of the nation grew.

The Italian Renaissance was copied as servilely by the French architects as the classic had been by the Italians. This was largely due to the fact that Catherine de Medici,

Fig. 58

Queen of Henry II (successor to Francis I), and mother of Francis II, Charles IX, and Henry III, was an Italian. Her influence dominated the court throughout this period, and the style continued into the reign of Henry IV.

The illustration in Fig. 57 will give an idea of the extent to which the richness of display was carried during the latter part of the reign of Henry IV and the early part of that of his successor, Louis XIII. Rich Italian marbles were imported for use as bases and door trims, and the wall panels were filled with the most elaborate paintings that the artists could devise. Columns and pilasters of enormous proportions were introduced to subdivide the walls, and heavy, projecting entablatures supported an elaborately paneled ceiling.

151. Louis XIV Period.—The period generally known as **Louis XIV** began in the reign of Louis XIII and extended into the reign of Louis XV. At this time, the great Gobelin tapestry works were founded by the French government, and many of the great palaces and royal residences were built. Architectural details were borrowed from the Roman Corinthian order and introduced independently as decorative details. The grotesque forms that had characterized the early Renaissance were abandoned, and the detail became more symmetrical and well balanced. Expensive woods were introduced for furniture, and the walls and the openings were hung with rich tapestries from the government works. Some of these are shown in one of the smaller rooms of the palace at Versailles, Fig. 58.

Shell forms were introduced in the acanthus ornament and also as a semidome form over niches and other recesses, but these were used sparingly and with dignity.

The Louis XIV period was characterized by an honest effort to produce a style of decoration distinctly based on the Italian Renaissance, but without the grotesque and meaningless detail.

152. Rococo Period.—The reign of Louis XV was one of great extravagance and luxury, and this was reflected in

161 § 49

FIG. 57

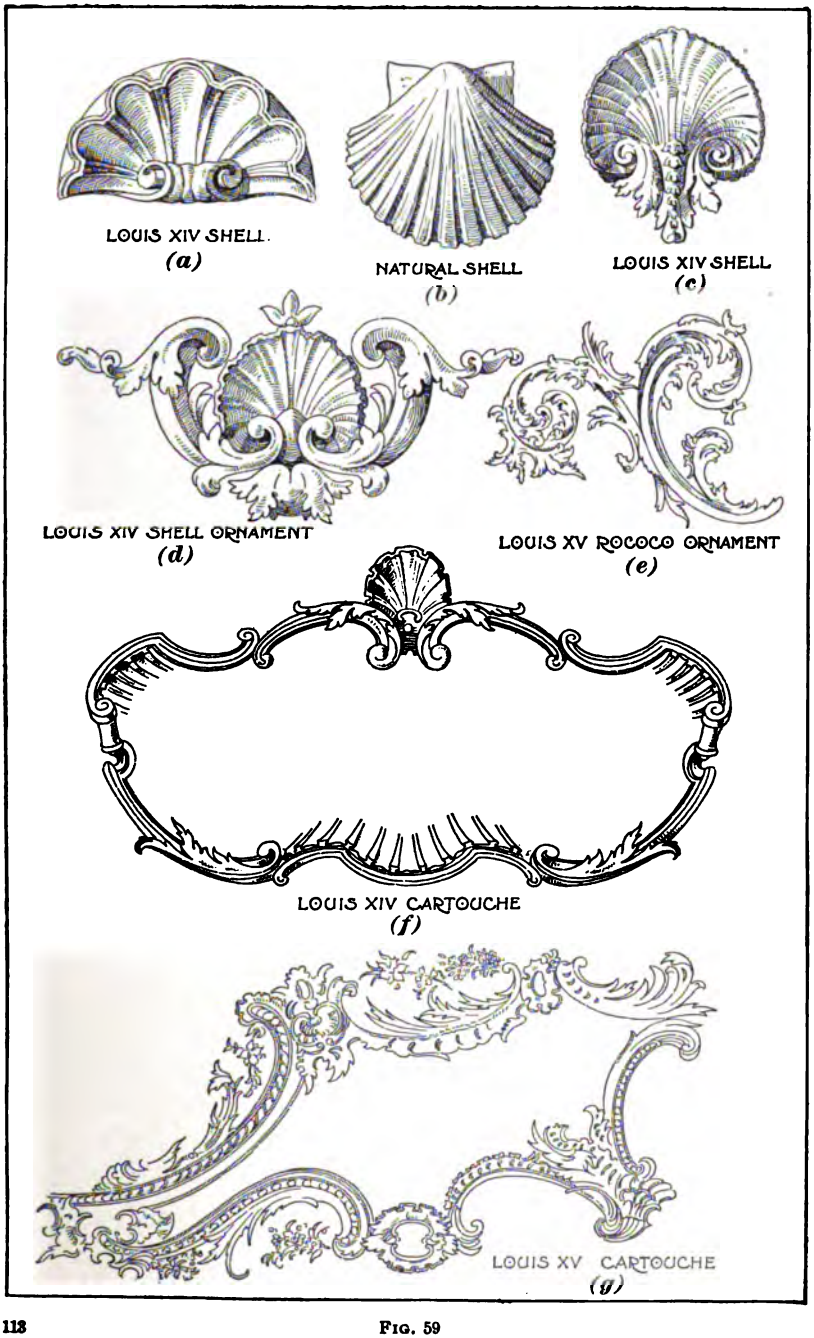

LOUIS XIV SHELL
(a)
NATURAL SHELL
(b)
LOUIS XIV SHELL
(c)
LOUIS XIV SHELL ORNAMENT
(d)
LOUIS XV ROCOCO ORNAMENT
(e)
LOUIS XIV CARTOUCHE
(f)
LOUIS XV CARTOUCHE
(g)

FIG. 59

the architecture. The well-balanced and symmetrical shell forms that were cautiously introduced in the previous style were twisted and curled into the most meaningless forms during this reign. Lack of symmetry was sought rather than avoided. Cartouches and panels, instead of being elliptical or rectangular, were outlined by a series of convex and concave curves and surrounded by a lot of flame-like scrolls and network that presented absolutely no symbolism or type. This period is usually known as the **Rococo period,** rococo being a term of French derivation meaning shellwork. In order to give this rococo ornament great prominence, it was richly gilded, and details of its scrolls stood out in great prominence, like nuggets of gold. The style was characterized by eccentricity and ostentation, without any attempt at harmony or good taste.

Various designers endeavored to outdo one another in eccentricity and originality. They appropriated the ornament of the Louis XIV period to their own uses, but twisted and contorted it until it lost its beauty and symmetry entirely. Where a design presented scrollwork on opposite sides, they would turn one scroll up and the other down, thus destroying the symmetry entirely, as in Fig. 59 (*g*), and finally the term rococo stood for all that was vulgar and ostentatious.

153. Shell forms, such as shown in Fig. 59 (*a*) and (*c*), were introduced in the designs of the Louis XIV period, sometimes as simple terminals, as in (*f*), and at other times with elaborate scrollwork, as in (*d*). The natural shell form, shown in (*b*), soon became merged into designs to such an extent that its identity was lost, and the scroll ornament of Louis XV became eccentric and meaningless. With Louis XIV, the ornament was executed with studied symmetry, as in (*f*), but with Louis XV, it was executed with equal eccentricity, as in (*e*) and (*g*).

154. During the Rococo period, the celebrated artists Watteau, Boucher, Tessier, Jacques, and others, who had designed tapestries during the Louis XIV period, executed frescos and wall paintings. These were varnished over in

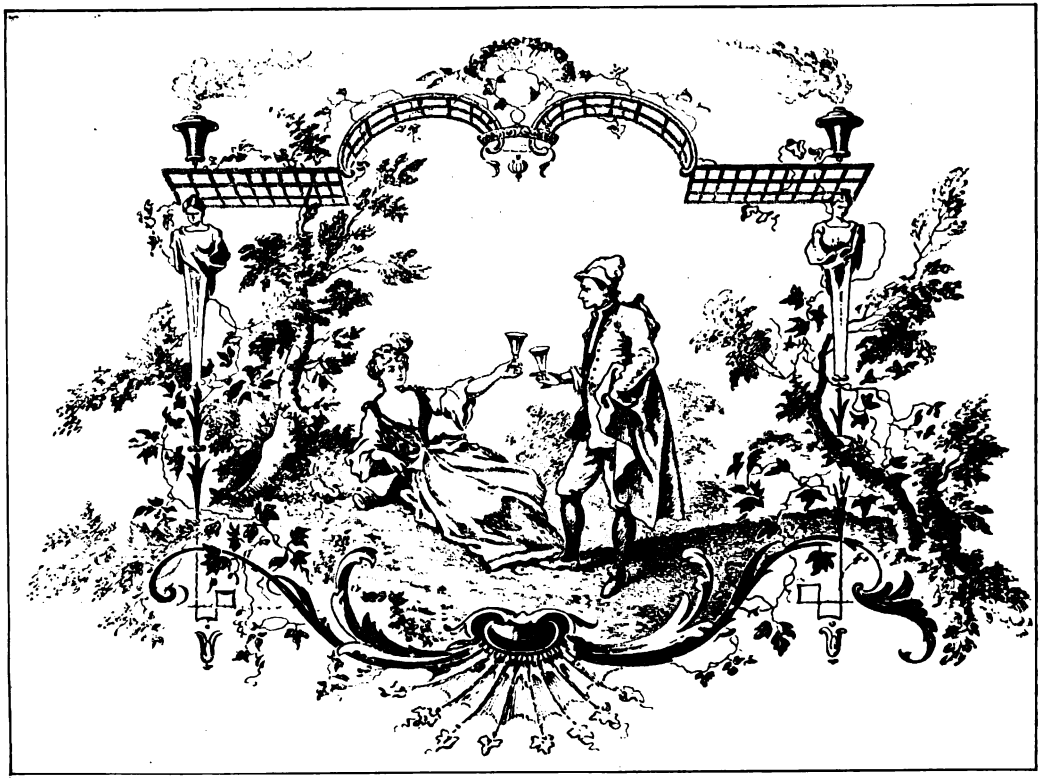


Fig. 60

FIG. 61

some instances with a transparent enamel as hard as porcelain. Panels of woodwork in furniture were painted by Watteau. These presented dainty pastoral scenes, in which impossible shepherdesses in short satin skirts attended toy flocks, or, as shown in Fig. 60, richly gowned rural maidens reclined on the ground sipping wine with equally impossible peasants. These paintings were framed with conventional designs of foliage, lattice, and rococo work, and became characteristic of the period. Their merit lay not in the propriety of their application, but rather in the beauty and delicacy of their execution.

155. Louis XV was a wasteful and extravagant monarch, and all of the decorative work of this period reflects these characteristics. One of his favorites at court, Madam Pompadour, had more influence over him than any of his ministers, and through her individual extravagance, she introduced a style of upholstery work that bears her name. This wilful woman, becoming tired of the carvings on the furniture and the frescos on the walls, had them entirely covered with tufted fabrics of a yielding character, so that for a while it was a fad to cover the chair frames and wall decorations—all beautiful examples of the artists' skill—with tufted silk or other expensive materials. Madam Pompadour was succeeded in the king's favor by the Countess du Barry, who endeavored to outdo her predecessor in extravagance, and her tastes dominated the decorative art during the latter part of this reign. As the reign of Louis XV seemed to live only to indulge its extravagances, the Louis XV period is characterized by vulgar, ostentatious display, which is rich in gilding, elaborate in brass, bronze, and rich metalwork, and a blaze of color in painting and decoration—an elaborate and extravagant excess of all that Louis XIV had introduced.

156. In Fig. 61 is shown one of the smaller apartments in the palace at Versailles. The walls and ceiling of this room are divided into panels and decorated with the rococo ornament characteristic of the period, as is also the furniture,

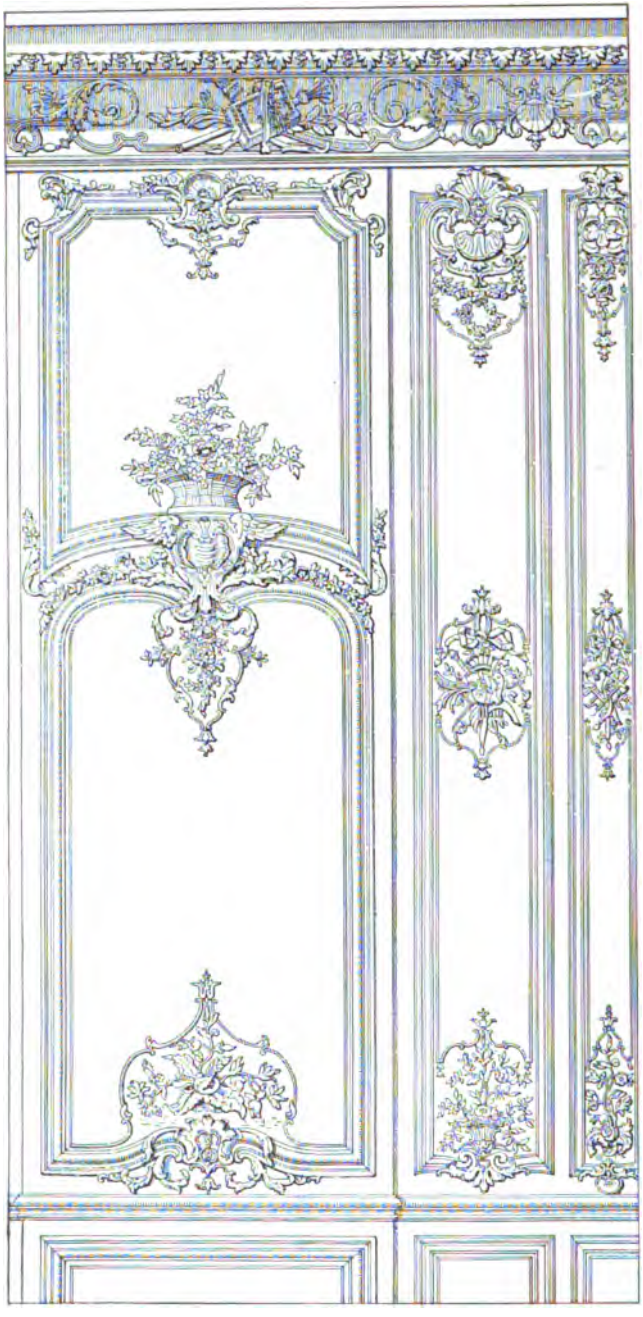


FIG. 62

161 § 49 FIG. 63

but here the ornament is not carried to the extremes that characterized the latter part of the reign. This room has been restored since the days of the extravagant king and his favorites, and much of the excess omitted. The mantel and mirror, and the chandelier frieze and angles of the ceiling still retain the meaningless scrolls, while the furniture, with its bandy legs and gold decorations, pronounce the period unmistakably. More characteristic are the wall panels shown in Fig. 62, which terminate in rococo forms, while floral and symbolic devices are introduced in raised designs.

157. Louis XVI Period.—Louis XVI was a weak monarch and lacked the courage to carry out the reforms that his queen, Marie Antoinette, considered necessary in view of the impoverished condition of the nation, which was brought about by the extravagances of the previous reigns. While the decorative themes of this period are known both as Louis XVI and Marie Antoinette, the honor for the reform in style is undoubtedly due to the latter. The period is characterized by a charming simplicity of detail, in contrast to the extravagance that had prevailed. The Louis XVI period was one of elimination of expensive luxuries. The elaborate paintings of Watteau and the extravagant tuftings of Pompadour were replaced by simpler panels of plain and inexpensive fabrics. The elaborate tortoise-shell inlaid furniture was replaced by simple designs in white and gold. The Marie Antoinette style rejected all the arabesque and rococo ornament, all the intricate hand-painted panels, and all the expensive metalwork and extravagant tuftings of rare fabrics. Fabrics were used extensively, but only in place of the more elaborate panel decorations that disappeared with the previous reign. Marie Antoinette decoration impresses one with its delicacy, simplicity, and good taste.

Where wall panels were painted, the designs were simple and much less expensive than in the previous reign, but most beautiful and delicate effects were obtained. Fig. 63 shows a painted door of this period. The walls of the room

FIG. 64

FIG. 65

were divided into similar, but larger, panels and were ornamented with floral arabesques of various designs.

The Louis XVI period was a distinct reform, freed entirely of the burdens of elaboration that had characterized the French style for hundreds of years.

158. In Fig. 64 is shown a characteristic Louis XVI interior from the palace at Versailles. The plain paneled walls and the simple furniture contrast strongly with the elaborations shown in Fig. 61. The chairs are simply upholstered in a striped fabric with a figured background, and the footboard of the bed is simply enameled in white, with a slightly raised festoon across the top. Sometimes, the footboard also was covered with cloth to match the other furniture, and in this manner many dainty effects were obtained. The interior shown in Fig. 65 contains examples of Louis XVI furniture, but the walls are hung with tapestries and paintings by Watteau.

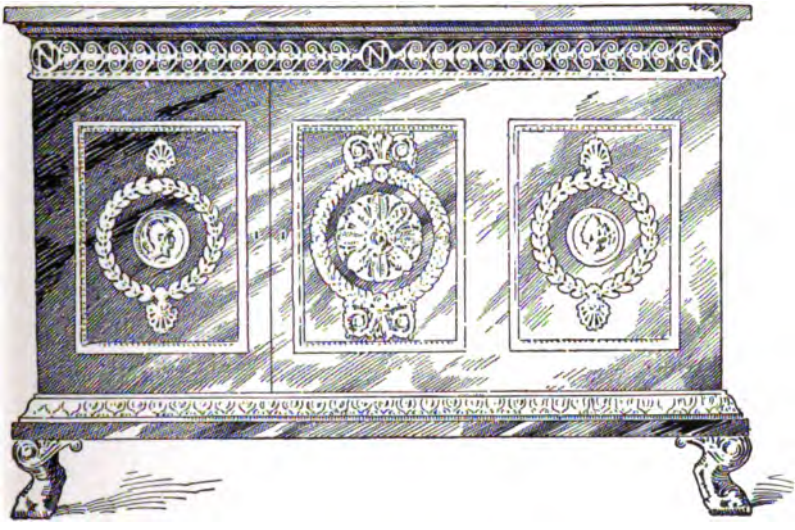
159. In visiting the Renaissance palaces of France, it is almost impossible to find any one apartment that is carried out strictly in accordance with any specific historic period. Most of these palaces are now converted into museums, and many details of one period are placed in a room with details of an adjacent period simply because they belonged to some person that lived at a period when the two styles overlapped. Then, also, the furniture that was made in the latter part of one period would continue to be used until it became worn or broken, even after a new style came into vogue. Thus, at the accession of Louis XVI and Marie Antoinette, there was only the rococo, scrolled, and gilded decoration of the previous reign, and no new designs were created until new furnishings were required for some of the apartments. The beautiful paintings of Watteau would not then be destroyed, but would be hung as works of art, which they were, and so form a part of the decorative details of the succeeding period. For this reason, many modern designs present the characteristics of a period more than many of the actual rooms in the historic buildings themselves.

160. The modern decorator, in preparing a design for a specific period decoration, can confine himself to details that are characteristic of that period, and he need not use any material that is better suited to anything else. On the other hand, thorough familiarity with the characteristics of each period and knowledge of what is historically permissible to use with it, will enable a decorator to satisfy the demands of exacting patrons without offending architectural good taste. For instance, rococo ornament, Watteau paintings and tapestries, expensive furniture inlaid with tortoise shell, gold, and silver, and walls and furniture upholstered in tufted fabrics, were characteristic details of the Louis XV period. None of these elements could be combined with the simple elements of the Louis XVI style, except the paintings, and these were retained only as works of art and accessories and not as elements of the decoration itself.

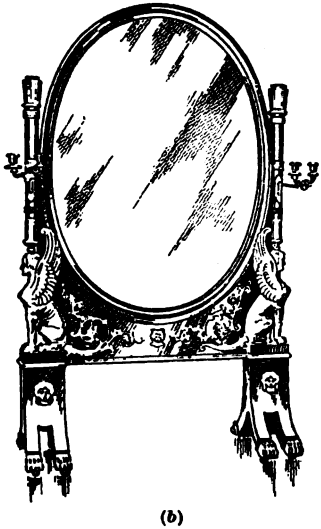
161. Empire Period.—After the extravagance of Louis XV and the weakness of Louis XVI came the French revolution, and from 1793 to the opening of the 19th century, art in France made no progress. After this period of bloodshed and terror, everything pertaining to royalty was exceedingly unpopular, and the designers endeavored to create a style that should contain nothing to recall the previous centuries of monarchy. Purely Roman forms could not be used on this account, so the efforts of the designers were directed from the Roman to the Greek, and from the Greek to the Pompeian. The Pompeian style as adopted by the French designers expressed a daintiness and delicacy that at once gave it popularity—a popularity not only in France, but also in England, thus introducing a new and characteristic decoration there.

162. Pompeian art forms were limited, however, owing to the lack of knowledge concerning the buried city; but with the few forms attainable and with Greek ornament familiarized by the publications of recent scholars, a style developed. The Greek style of dress at once became popular, and the palmette, honeysuckle, and fret ornament

FIG. 66



(a)



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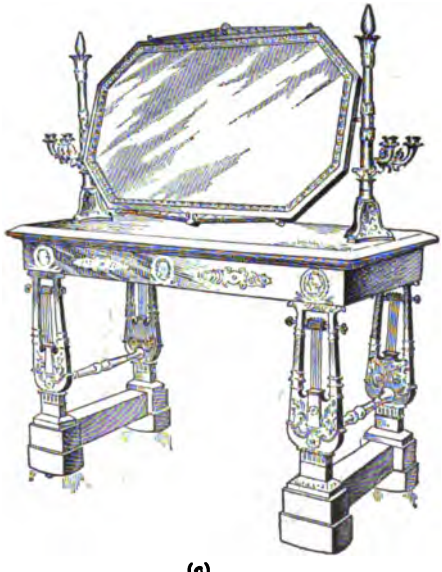


(c)

FIG. 67

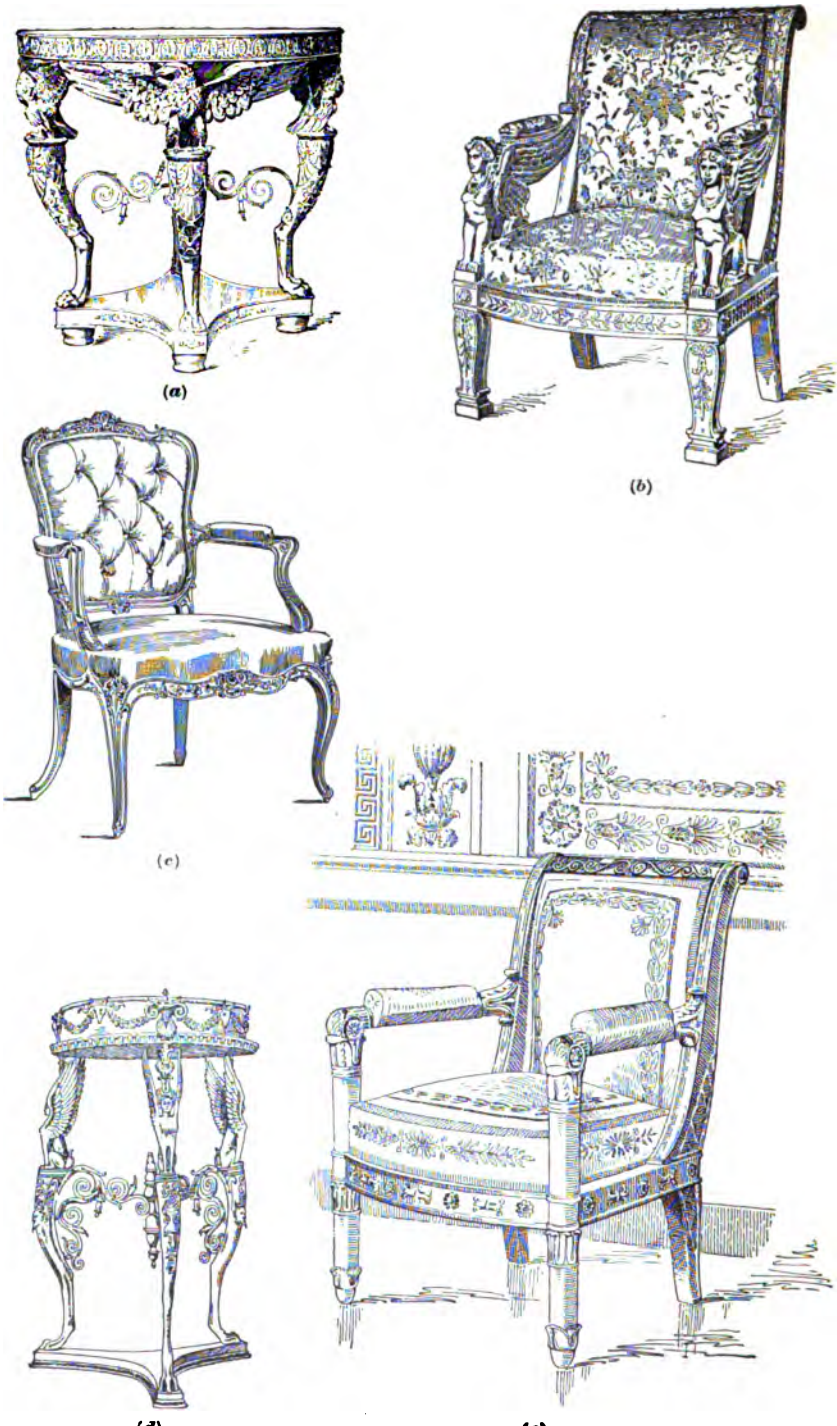


FIG. 68

were introduced into all schemes of decoration. The Pompeian arabesque suited the new conditions exactly, and during the transition, or **Directoire period**, as it was called, a decorative style developed that was afterwards called **Empire**, as it was adopted and encouraged by Napoleon when he became emperor, although it was created long before Napoleon was ever heard of. There was no detail in the Empire period that was introduced by Napoleon, except the laurel wreath and the crowned N.

The characteristics of the Empire period lie not so much in the designs themselves as in the application of the details. These details were executed in brass, or in gold, and were appliquéd against a dark ground of hardwood, such as mahogany, presenting at once sharp contrasts of color. There was little carving, and the metal appliqués of Greek and Pompeian design, with the laurel branches, wreaths, torches, bees, and the crowned letter N, constituted about all the ornamental devices. These devices were also woven in the fabrics, and in some instances were painted and inlaid in the wood.

163. In Fig. 66 is shown a room containing Empire-period furniture and draperies, but the walls are not carried out in harmony with the style. The cabinetwork, as will be observed, is left plain, being simply decorated with wreaths and festoons in appliqué metal. The lines of the molding were sometimes gilded, and often they were worked in solid metal as in Fig. 67 (*a*). Broad, unbroken panels, mostly in mahogany, are characteristic of the style. The walls were divided into long panels reaching to the ceiling, without a frieze, and were decorated either with rich arabesques of Pompeian origin, or with light festoons of laurel or flowers with pendant wreaths. Greek ornament and fretwork was also used as borders of wall decoration and as inlay in furniture. Tables and chairs were supported on straight, square, and turned tapering legs, and the former sometimes on lyres, as in Fig. 67 (*c*), eagles, as in Fig. 68 (*a*), and grotesque figures. The arms of chairs were sometimes

formed of Greek sphinxes, as in Fig. 68 (*b*), and the seats and backs were upholstered in brocade silks, the pattern of which partook of the same character as the painted ornament and metal appliqué, as shown in the upholstery and wall decoration in Fig. 68 (*e*). Sphinxes were also introduced as decorative supports for frames and cartouches, as in Fig. 67 (*b*), and as terminals to table legs in Fig. 68 (*d*). The lower portions of the table legs in Fig. 68 (*d*) are modeled after a dog's leg, and suggest the origin of the bandy leg so characteristic of the furniture of this and the previous period. There is certainly some relation between the leg of the Louis XV chair, Fig. 68 (*c*), and the characteristically Pompeian table shown in (*d*).

ENGLISH RENAISSANCE

164. The **English Renaissance style** was greatly influenced by the art of Holland and Flanders, owing to the great trade carried on with the two countries across the English Channel. This style can be divided into three periods: the *Elizabethan*, 1558 to 1649; *Queen Anne*, 1660 to 1714; and the *Georgian*, 1714 to 1820. Each of these periods presents great individuality, but unlike the periods of French Renaissance, this individuality is due to the work of individual designers and their influence rather than to the idiosyncrasy of the reigning monarchs. England had no foreign queen to influence local style, and there were no religious wars going on to deplete her treasury, as was the case in France. England was at this period more a copyist of surrounding countries (France, Holland, and Flanders) than of Italy, the home of the Renaissance style. Thus, many of the most characteristic details of the early Renaissance in England, unheard of in Italy and France, were elaborate adaptations of ideas borrowed from the simpler style in Holland, where long wars prevented the display of wealth in art and architecture.

165. Elizabethan Period.—In order to appreciate fully the character of the so-called *Elizabethan period*, which

FIG. 69

FIG. 70

really began in the reign of Henry VIII and extended into the reign of James I, it is necessary to turn back to the latter part of the feudal ages, when England was emerging into her modern civilization. With the invention of gunpowder,

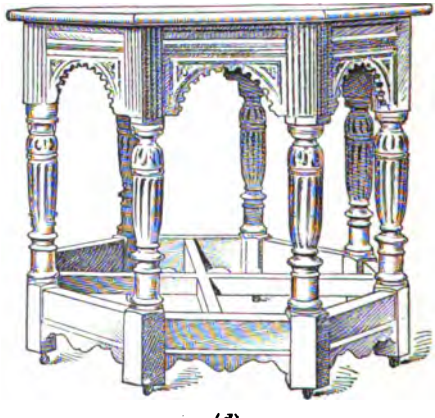
FIG. 71

the castle had gradually grown into a residence, and with the education of the Renaissance the residence developed into the modern English home (see *History of Architecture and Ornament*, Part 3). The old walls were still hung with the

(a)

(b)

(c)



(d)

FIG. 72

Gothic tapestries, as in Fig. 69, or they were paneled in rectangular bays, with columns and pilasters based on classic ideas borrowed from Holland.

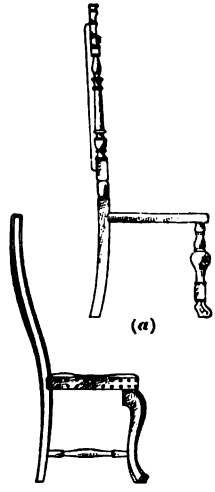
166. In Fig. 70 is shown the long gallery in Haddon Hall, England, with its broad mullioned windows, and its arched panels between short, stumpy pilasters having paneled faces. The bases of the pilaster pedestals taper downwards, like the leg of a table, and the lower panels are divided into rectangular forms. This tapering of pedestals, newels, and balusters was characteristic of the period, and frequently these elements were richly carved in arabesque patterns and strapwork, as shown in Fig. 71. Grotesque figures holding heraldic shields surmounted the vase-like newels, and wooden-framed grille-work often served as a balustrade.

167. Beds with four posts and supporting an entablature and enclosed with draperies, based on the Dutch model, found service in the rooms. The chairs and tables, Fig. 72, were curious combinations of ideas borrowed from both France and Holland, and though quaint and picturesque in design, they were at first exceedingly uncomfortable. Rush seats were more in use for chairs than upholstery, and straight, high backs prevented a reclining position or an even rest for the spine.

The Flemish chair, Fig. 72 (*a*), presents the leading characteristics that are found in the furniture of the Elizabethan period, and while the Jacobean chairs (*b*) and (*c*) retain many of the Dutch characteristics they show a tendency to progress in the direction of ease and comfort. The seats of the earlier chairs were usually high for the reason that the absence of suitable floor covering made it desirable to keep the feet from the floor, and a plain stretcher between the two front legs was introduced as a suitable place to rest them.

168. Queen Anne Period.—Between the Elizabethan and the Queen Anne periods there is a break of eleven years, during which time England was under the rule of Cromwell and the commonwealth, and little or no progress was made

(c)



(a)

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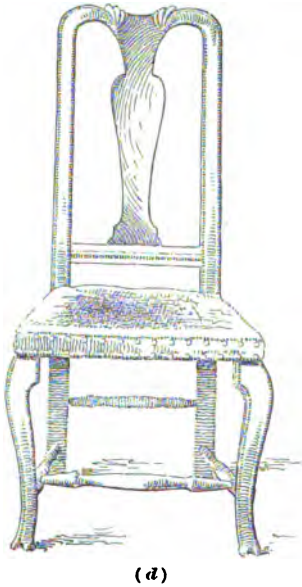

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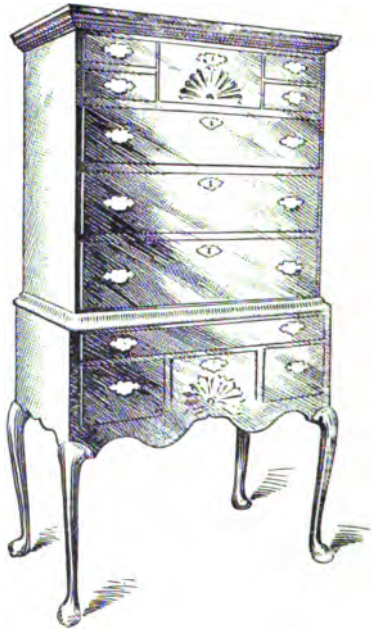


(e)

FIG. 73

in decorative design. In fact, during this period also, England was in a state of perpetual turmoil, and little encouragement was given to fine arts. The architecture became more classic in detail, and the interior decoration followed suit. Wardrobes, bookcases, and other heavy pieces of furniture were crowned with an open pediment, as were also the doorways, window frames, wall mirrors, etc., as shown in Fig. 73 (*a*). The fabrics that were hung as curtains, and also such as were used for upholstery work, were of Dutch manufacture, as there were no English weavers of note during this period.

169. After James II, William and Mary, both of whom were decidedly Dutch in their tastes, came from Holland to rule England. Mary, though a daughter of James II, had been married twelve years to William, who was governor of the Netherlands, and when they came to the English throne, they introduced into their new surroundings all the details of Dutch life. They had been living in Holland with all the accessories of a Dutch governor's household, and had been surrounded with the best the country could afford in the way of luxuries and embellishments. The furniture and ideas of decoration that they introduced into England were a Dutch development of the Italian and late French Renaissance, and it revolutionized the style then in vogue.

170. Elizabethan furniture, Fig. 72 (*d*), had been ponderous and heavy, as durability had not yet been looked upon as a quality to be separated from massiveness and great strength. Dutch furniture was strong and durable, yet it had an appearance of lightness, and the nobility and gentry hurried to their cabinetmakers with orders for furniture in the new style, in order to furnish their houses in a manner befitting the tastes of their king. Dutch furniture was imported by the shipload, and English craftsmen were forced to imitate the Dutch style or go bankrupt.

The one detail in the furniture that caused the greatest amazement was the *cabriole*, or *bandy leg*, Fig. 73 (*d*) and (*e*). It had existed in France for years and was also known in

Spain, but this was its first appearance in England, and, by itself, it revolutionized the style. Another innovation was the chair back. The Elizabethan chair, shown in (*a*), had a perpendicular back of straight lines only, but the back of the Dutch chair, shown in (*b*), was curved to fit the sinuous line of the human spine and inclined backwards.

171. An increase in literary taste introduced an improved form of desk, and the device known to this day as the *Dutch desk* was introduced during this period. It developed from the bureau. A top was added and pigeonholes and drawers were placed behind a slanting cover that turned down and thus formed a writing table.

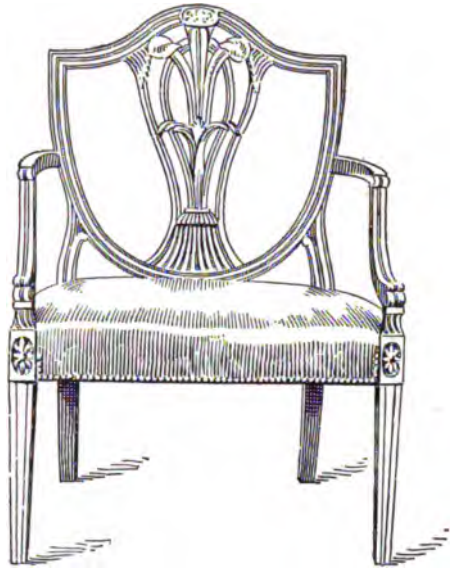
The *high boy*, Fig. 73 (*e*), a term developed from the French "haut-bois," was a development of this period. It consisted of a bureau supported on four cabriole legs, although its Dutch prototype stood on six legs turned in the characteristic bulbous style of the Netherlands craftsman, as on the chair shown in Fig. 72 (*c*).

172. Holland at this time was working much in marquetry and inlay, and the Italian Renaissance scrolls are seen worked out in England with inlays of sycamore, maple, holly, and mahogany. Oak, chestnut, and walnut were also used extensively. It was during this period that Louis XIV revoked the edict of Nantes, that had given Protestants throughout France an equal standing with the Catholics. As a consequence, many thousand skilled Protestant craftsmen fled to England and lent their skill to the development of the style. It was one of these Frenchmen that produced the "grandfather's clock," which has survived as a favorite form of timepiece down to the present day.

The Queen Anne period was the mother style of the American colonial style in the British colonies, and the simple classic designs rendered in wood, with white enamel paint, characterized the homes of the American colonists.

173. Georgian Period.—The Dutch style, carried into England by William and Mary, was at first imitated and then developed by the English designers, and during the

(a)



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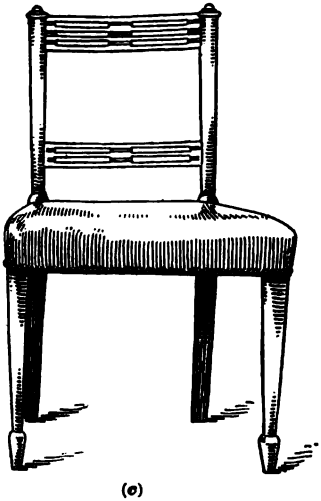


(c)

(d)

FIG. 74

Georgian period, the characteristics of decoration are found associated with the designers of several styles and their imitators. Chippendale, Hepplewhite, and Sheraton, the Adam brothers, and their followers dominated the character of the Georgian period. Chippendale adopted the cabriole leg of the Dutch chair and added to it the characteristic back of the French, as shown in Fig. 74 (*a*). Sheraton was a worker in marquetry and inlay, and consequently introduced square legs to his furniture in order to provide suitable surfaces for inlay. The chair shown in Fig. 74 (*c*) and the table (*d*) are designs of Sheraton. The round tapering leg with a conical foot, as in (*c*), is similar to some of the designs of Marie Antoinette. Some of these tapering legs were fluted or reeded as in the French style, but many of them were square, as in the table (*d*), with inlaid marquetry of rare woods. The Adam brothers produced a style of interior decoration and furniture based on the classic and Pompeian styles, with influences from the French Empire period. The Adam style was also popular in American colonial homes, and it found many imitators on this side of the ocean.

174. Robert Adam, the second of the three brothers, visited Italy about 1760 and studied the classic style. On his return to England, he and his brothers erected many buildings during the reign of George II, and the style speedily became popular. Roman influence is evident in all of their works, but the Pompeian details are stronger in the interior decorations. The rich and voluptuous scrolls and festoons of the Roman school became more attenuated in the handling of Robert Adam, and the same delicacy and refinement that characterized the French Empire period attended his designs.

From interior decoration, the step to furniture design was simple, and soon designs for furniture in the Adam style became popular. This style was an adaptation of the French Louis XVI style in form, with characteristic surface decoration introduced by Robert Adam. The chairs were small and

delicate, with low, narrow backs, while the legs were usually straight, but occasionally with an outward curve—never, however, with the compound curve of the Dutch cabriole. The sofas and backless couches were based on Greek ideas, but they were always of the same delicacy and frail appearance as the chairs. As Chippendale worked almost exclusively in mahogany, Adam adopted satinwood as his favorite material, and as the wood was new to the public of the period, it became popular as a novelty.

An innovation by Robert Adam was the painting of classic designs on the golden surfaces of the varnished satinwood. The designs were painted after the manner of inlay, but without any attempt at imitation or deception. The designs were executed in fine lines of classic detail and in soft colors, and were charming in their delicate simplicity. Occasionally, he introduced woven cane into the chair backs, running the strands to conform to the outline of the panels, whether oval or rectangular.

175. Hepplewhite, like Sheraton, followed the lines of the Louis XVI furniture, but although contemporary with Sheraton, he was not an imitator of the Sheraton style. Hepplewhite introduced the shield shape to the back of his chair, which was rarely upholstered, but formed an open frame for a central carved, or pierced, design, as in Fig. 74 (*b*). The shield back of Hepplewhite chairs was closed at the top with an even, sinuous curve, while Sheraton, who also used shield backs occasionally, used a broken rail for the top rail of the back. Hepplewhite's central shield was varied in each design, usually following the classic and occasionally inserting the simple upright slats, in the same manner as Chippendale. The legs were usually square and tapering, but they were not inlaid as they were in Sheraton's designs, nor were they painted as were those of the Adam brothers. Hepplewhite's furniture was usually executed in mahogany, and in this respect and for some of the treatments he applied to the backs, he undoubtedly borrowed ideas from Chippendale.

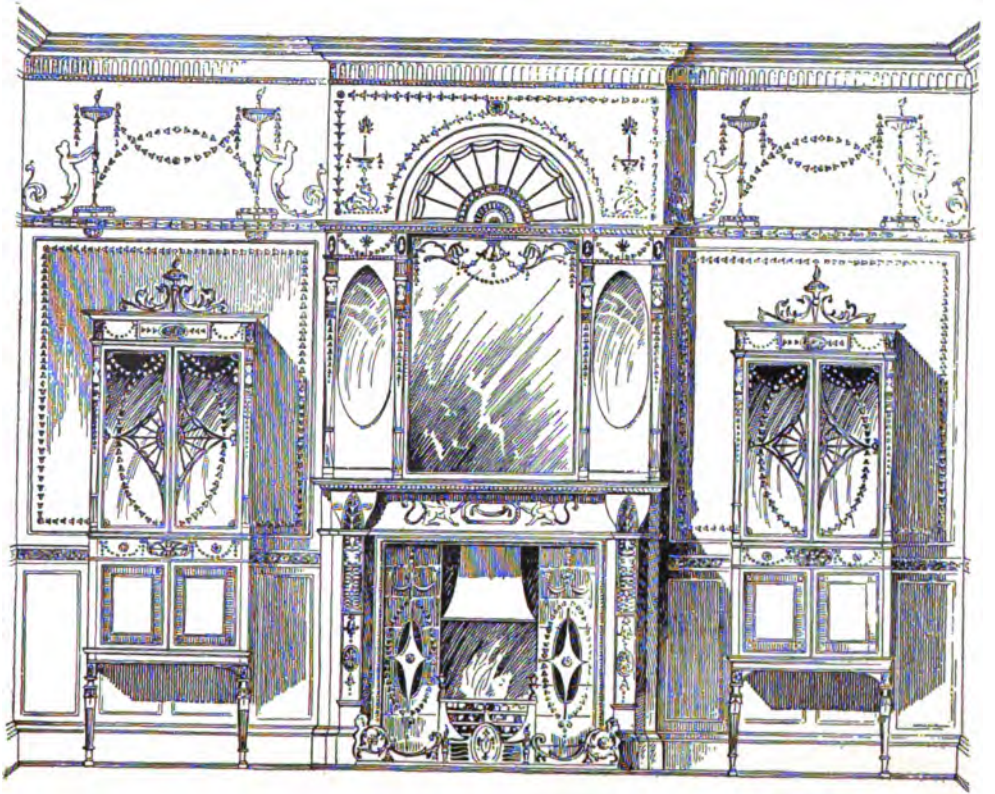


FIG. 75

176. The details of furniture design of the Georgian period were in harmony with the wall decorations, and therefore considerable detail is here given to the styles of these furniture designers, and in order to prevent confusion, the characteristics may be summed up as follows: Chippendale's designs were in mahogany, cabriole-legged, with backs after the Louis XV style. Sheraton followed the simpler lines of the Louis XVI style, but ornamented the surface with marquetry. Hepplewhite worked contemporaneously with Sheraton, but he did not copy Sheraton's ideas in any respect. While Hepplewhite followed the Louis XVI idea in chair legs and back forms, he adopted Chippendale's treatment of these in details and materials.

That part of the Georgian period that was dominated by the designs of the Adam brothers is particularly of interest to Americans, as these designs were the prototype of American interiors that are characteristic of the American Colonial period. Color is introduced into their decorative schemes in a most refined and delicate manner. The anthemion, scroll, and arabesque were modeled in panels, but they were contrasted with the background by a variation of color. Pale shades were used, and delicate tints of blue, red, and green formed either the background or the ornament, contrasting with which, gold was also used in some places, but very sparingly. The scrolls and classic ornament borrowed from Rome, however, did not partake of the rich voluptuousness that characterized the ornament of the time of the Cæsars. English social conditions demanded its refining; consequently, the ornament of the Adam brothers became delicate and attenuated, retaining the delicacy of the Pompeian and the richness of the Roman. In Fig. 75 is shown a characteristic Adam side wall with a mantel and cabinets. It presents many characteristics that afterwards emphasized the Empire period, but the Adam brothers died when Louis XVI was still on the throne of France.

PRESENT PERIOD

177. The 19th century produced nothing worthy of note in the way of a new style until its closing years. The Empire period had died in France with the downfall of Napoleon and the restoration of the monarchy. All the decorative ideas of the previous period being characterized strongly with the initial and devices of the emperor, they were speedily abandoned, and designers turned again to the scrolls and shells of Louis XV as being less obnoxious to the royalists. This had its influence in England, but not for any length of time, and an attempt was made to revive the Gothic style as being characteristically English. In the meantime, machinery was introduced for the manufacture of furniture and other decorative details, and under the dominating influence of the turning lathe and the scroll saw, all the individuality of the designer and craftsman was lost, and the designs of the day became meaningless and ugly. Besides this, black walnut was substituted for oak and mahogany, and the somberness of this material precluded the design of light and fanciful interiors.

178. Toward the end of the 19th century, a final effort was made to overthrow the hideous conceptions of the past fifty years and to establish something entirely new and worthy of an artistic people. This effort first showed itself in London, in what was termed the "æsthetic craze." A small coterie of enthusiasts "turned to nature" for inspiration, and produced designs in floral and other natural forms that were as inappropriate as they were novel. These æsthetes advocated the abandonment of all prevailing forms, even in dress, and recommended limp, flowing gowns and studied poses, while decorative surroundings were to be in trailing inert lines and the palest of colors. The idea was too absurd to gain popularity in this practical age, but it had the beneficial effect of diverting the public mind from copying the past. At this time, William Morris, the pioneer of the modern style, appeared and designed all manner of

details in a new form that was based on nature and without historic precedent, except in underlying principles.

179. The Morris idea was simply to turn to nature for inspiration, instead of copying and recopying something that some person had done before. His designs were based on natural forms, but they never pretended to portray these forms naturalistically. Morris lectured, taught classes, and wrote books, thus gaining many followers, and the modern *Morris style* in England, the *Craftsman style* in America, *L'Art Nouveau designs* in France, and the *Secession style* in Austria, are the outcome of this same idea. All four countries were working on the same principle, but they produced different results because of the different traditions that had influenced their history and the development of their crafts.

The style can be summed up as a craftsman's style, no matter what its local application may be, for whether in England, in France, or in Austria, it is based on the fundamental theory of designing to suit the material, purpose, and decorative possibilities of the article to which it is to be applied. In France, this style is deeply impressed with the influences of the better elements of the Louis XIV to Louis XVI styles. In furniture, it retains the shapes that were used during the time of Madam Pompadour and Marie Antoinette, but develops them with the details of the new style. In England can be seen the influence of the traditional Gothic; Germany and Austria run to grotesque and fantastic ideas; and in America, the crude forms of the Spanish Missions in California characterize the early efforts. But, taken all in all, the best results of this style are due to the training of the artist to be a craftsman, and the education of the craftsman along the lines of true art. The one may design and not execute, but he must thoroughly understand the possibilities of the craftsman and the tools employed in order to carry out the ideas set forth in the designs. The other may execute but not design, but he must be able to comprehend the artistic motives in the designer's mind.

FIG. 76

Fig. 77

Fig. 78

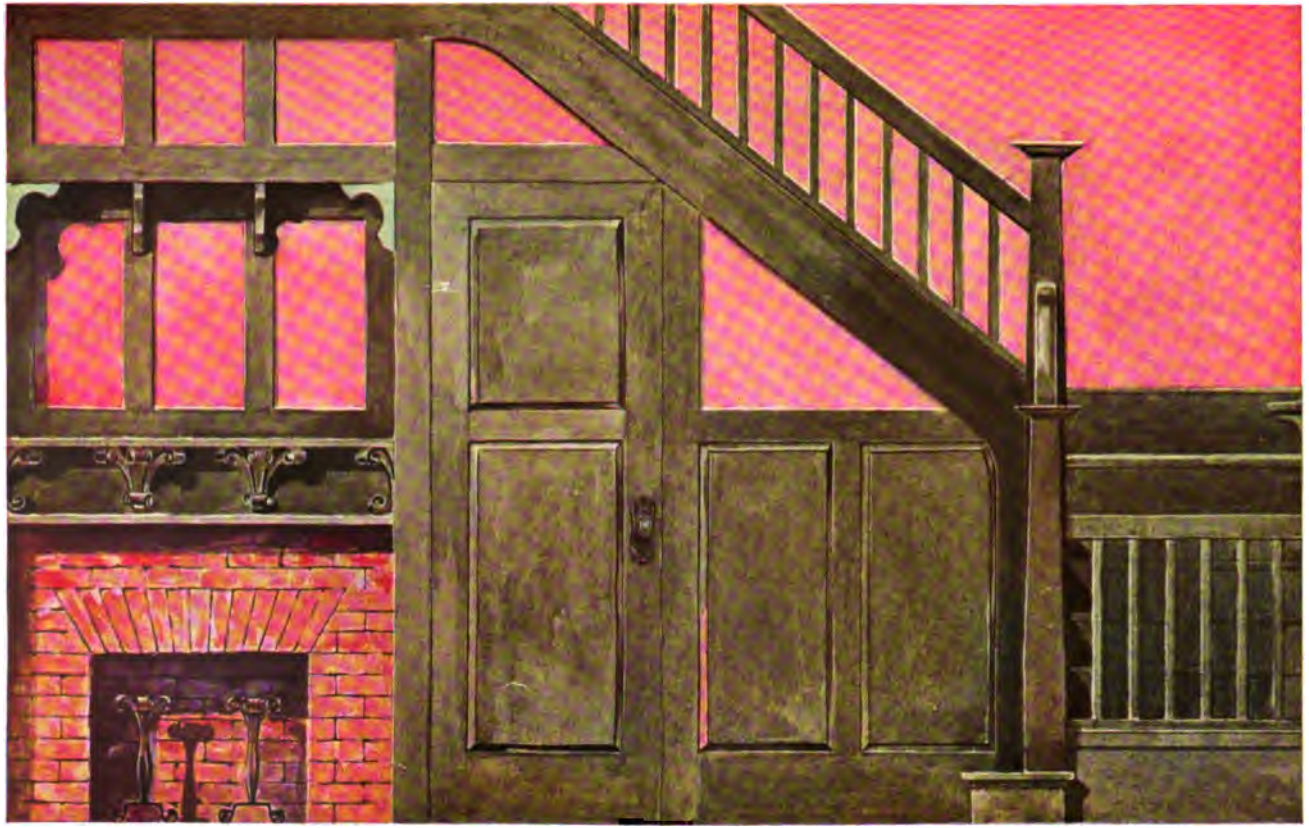
Fig. 79

180. L'Art Nouveau Examples.—In Fig. 76 is shown a design for the side wall of a room in the style called **L'Art Nouveau.** The motif used is the peacock feather, and the idea is well carried out. The frieze consists of a conventional distribution of the "eyes" of the feathers, while the field is spotted with the "tufts." The frame and panel of the door are somewhat Gothic in their structural honesty, but the sinuous curves and conventional treatment give the design great individuality. Furniture that har-

FIG. 80

monizes with this treatment is shown in Fig. 77 which is a photograph of the room worked out in the design shown in Fig. 76. The upholstery is in leather, and the wood is light-colored walnut, finished natural.

181. Secession Examples.—In Figs. 78 and 79 are shown two rooms finished in the Austrian style of this modern design, the simplicity of which is strongly suggestive of Japanese motifs. The walls are hung with decorated burlap, and the woodwork is in a weathered-oak finish. The



161 § 49

FIG. 81

161 § 49

FIG. 82

door treatment in Fig. 79, with its supports for a curtain pole and its free standing grille, is interesting. The sinuous curves that characterize the door framing in Fig. 77 are found in Fig. 79 in the hand rail across the glass.

182. Example of Morris Style.—The English treatment is shown in Fig. 80, which illustrates a simple folding screen with severely conventional renderings painted on its wooden panels, and the outlines of the forms cut in or burned in by pyrography.

183. Craftsman's Examples.—The simple craftsman's treatment is shown in the hallway, Fig. 81. This is the hall of the small dwelling plans for which are used as exercise in *Architectural Drawing*. Here, the walls were covered with a red cartridge paper, while the woodwork was worked absolutely plain and stained a weathered green. The result seems crude, but the design is very pleasing in its simplicity and at the same time is not expensive.

184. The use of battens against a wall of cartridge paper is shown in Fig. 82. The battens are 4 inches wide, and are placed so as to divide the wall into a pleasing variety of vertical and horizontal panels. The Dutch figures in the central horizontal panels are from a standard wallpaper pattern, and the sketches in the lower panels are rendered by hand. On each side of the fire opening is a low bench, and the chimney front is appropriately finished in Dutch tile. The chimney hood projects over the benches and is covered with small terra-cotta roofing tiles.

CEILINGS

185. **Ceilings** have ever afforded an inviting field for the display of decorative skill. They are always in plain sight, with nothing to obstruct the view, and are so situated that there is little danger of their defacement through contact with furniture or other fittings. Strictly speaking, a ceiling is the under side of a roof—whether it be the roof over a building or the roof over a room. In the decorative treatment of a ceiling, therefore, this fact should always be borne in mind. There are only two ways of treating ceilings; namely, *structurally* and *decoratively*. The former consists of the decoration of the vaults, or the beams that support them, and also the spaces and panels between these, while the other consists of a decoration entirely independent of the actual structural conditions.

186. The Gothic architects expressed their ingenuity in the molding of the vault ribs and the embellishment of the spandrels between them; or with the wooden construction in the decoration of the beams. The Renaissance designers followed out this system decoratively, but not structurally; that is, they decorated the vaults and beams as did their predecessors, but these vaults and beams were not always the vaults and beams that supported the roof or the floor above, but were either plaster or wooden imitations built over the apartments on a framework, entirely independent of the structural supports.

187. In Fig. 83 is shown the ceiling over the chapel of Louis XII in the château at Blois. Here, the ribs of the vaulting spring directly from the shafts of the columns, without any intervening capitals, and the vault soffits between these ribs are decorated in simple devices designed to suit their positions. This is a characteristic Gothic treatment—frank, straightforward, and structural, without attempt

to imitate something that was not really there, and with no effort to conceal the absence of details that later generations would have considered necessary.

188. The same will be observed in the timber constructions of this period, in which the beams are honestly exposed and their sides and enclosed panels decorated with suitable

FIG. 83

ornament. This treatment is shown in Fig. 84 (*a*), where heavy wooden girders *a b* support the lighter floor joists *a a*, *c c*, etc., and frame the long rectangular panels between. The decorative treatment makes no effort to hide this construction, but, on the contrary, emphasizes it by applying to the beam and girders a simple geometrical decoration, and to the panels, or more passive details, a light, fanciful

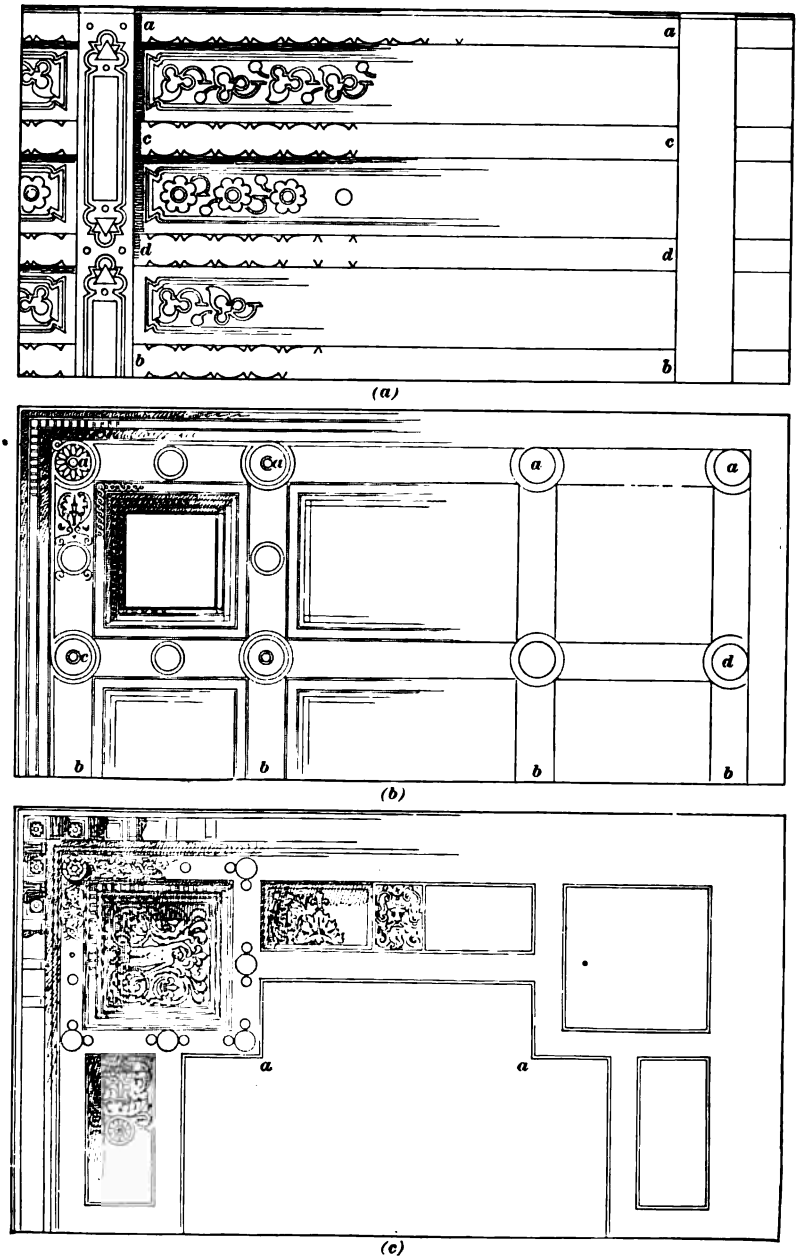


Fig. 84

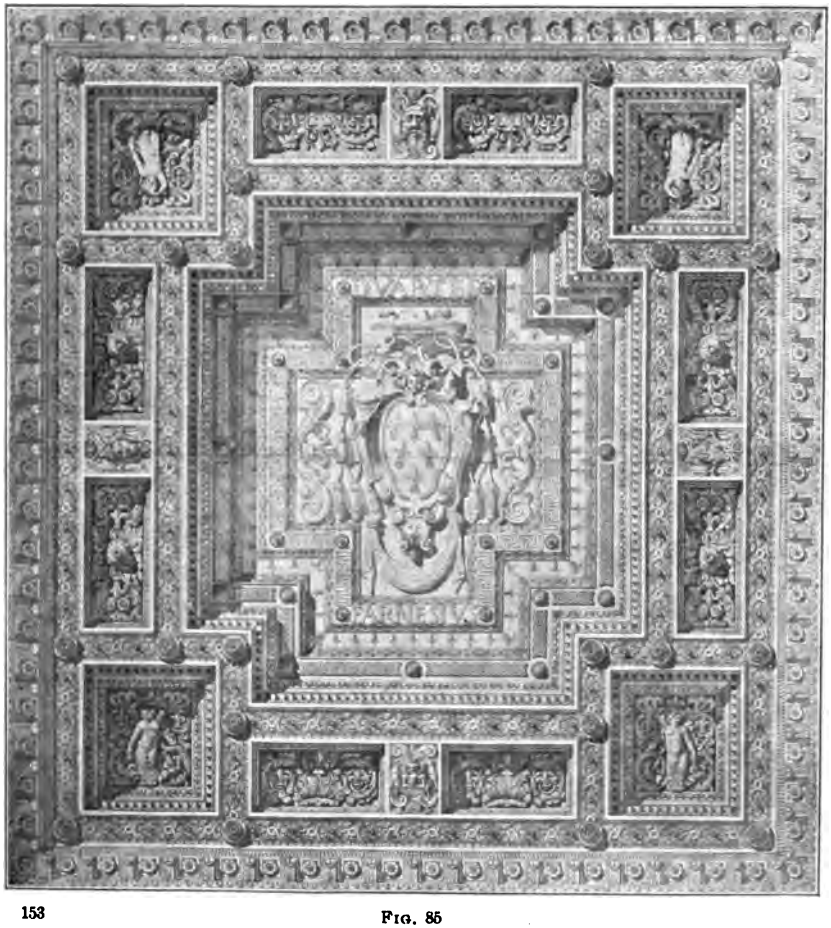


Fig. 85

decoration. This ceiling, therefore, is purely structural and has in no way been altered to enhance the decoration.

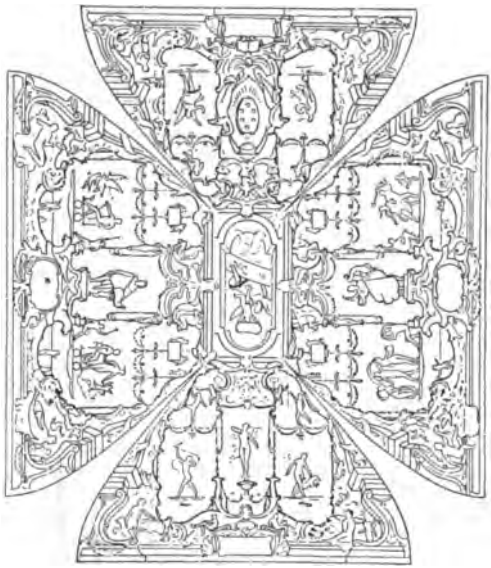
In (*b*), however, is shown a Renaissance design based on this same principle, but with the beams and girders all one size and spaced and framed into each other so as to form a number of square and rectangular panels of various sizes. The construction is independent of the real floor supports, but conforms to the structural idea, for the beams *a b* could be so placed, and the cross-beams *a a* and *c d* so framed into them as to produce a basis for this decorative effect and at the same time support the floor.

This is not true, however, of the design shown in (*c*), which is purely decorative and independent of possible structural conditions. None of the beams extend entirely across the room, and are therefore not supported at both ends. The structural idea has been ignored in order to produce a variety of panel widths along the sides and to secure a crucial panel in the center. The intersecting beams produce an overhanging angle at *a* that would not support any weight, and the design proclaims itself to be a plaster device built up under the real floor supports.

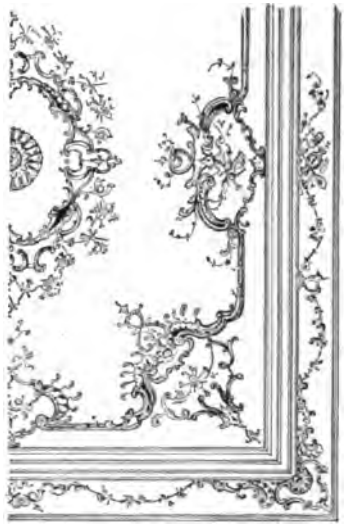
189. The latter system of designing was followed in one of the apartments in the Farnese Palace, and the resulting panels were richly decorated with relief ornament, as shown in Fig. 85. This figure illustrates clearly the general scheme to be followed in all designs for deeply coffered, or paneled, ceilings in the Renaissance style. Around the four walls of the room is carried a rich cornice, in this case, of the Composite order, upon which is supported the beams forming the panels. At the same time, the cornice is designed to represent the architrave of an entablature whose upper members form the decorative details of the panel moldings. The soffits of the panels are then decorated with characteristic devices suitable for the edifice.

190. Vaulted ceilings and domes were constructed of plaster in a similar manner and then decorated according to the style desired. These vaults were not ribbed and groined

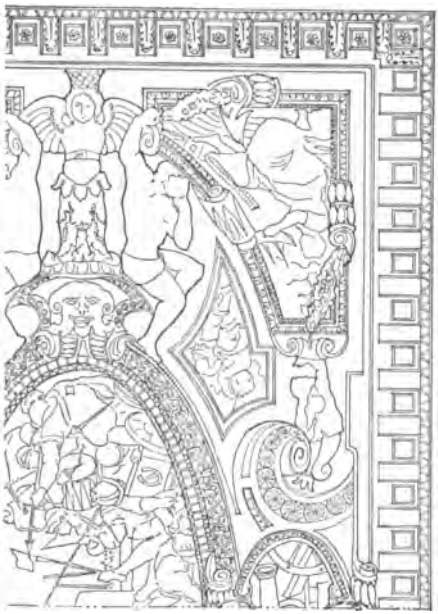
FIG. 86



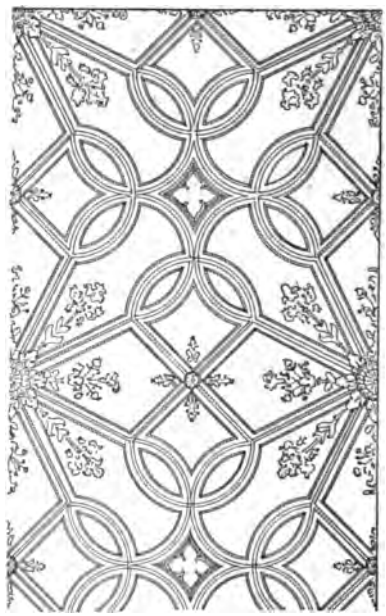
(a)



(c)



(b)



(d)

FIG. 87

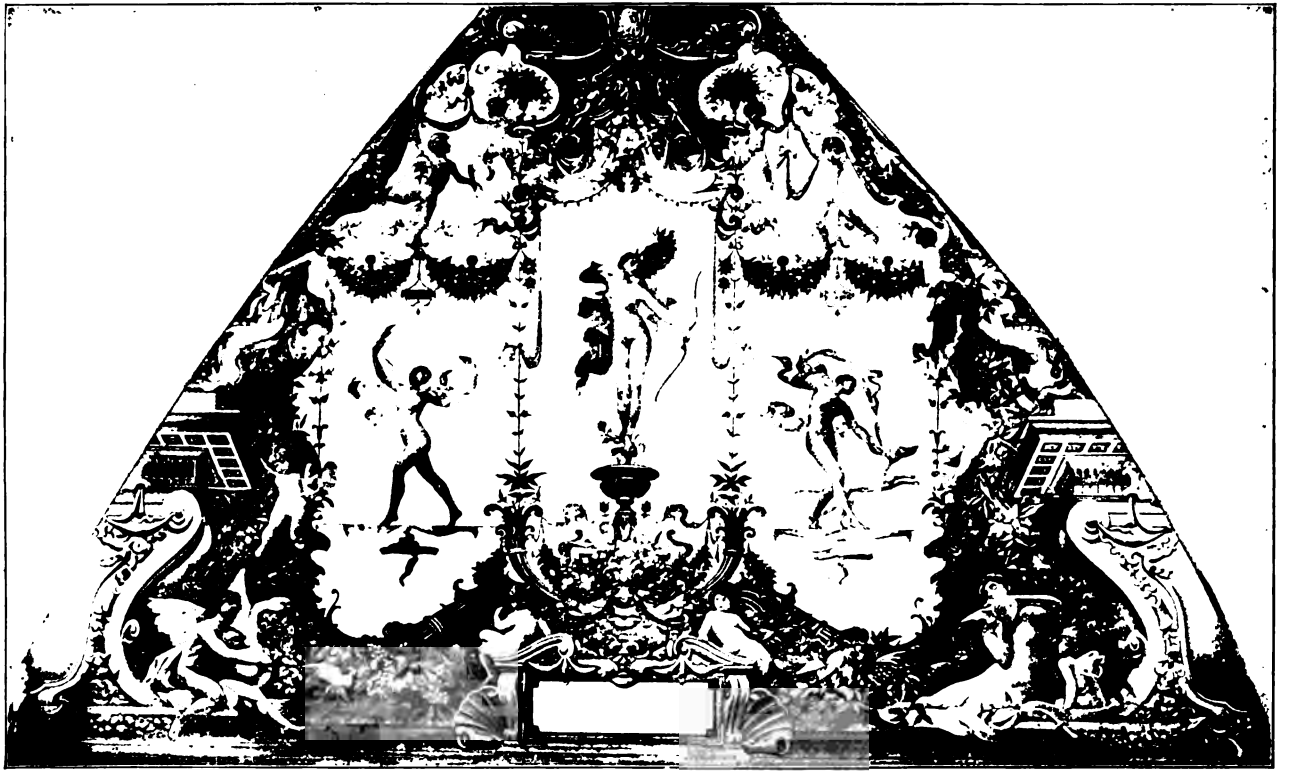


FIG. 88

as in the Gothic style, but were constructed to appear as the old Roman vaultings with elaborate paintings on their soffits and spandrels. Fig. 86 shows the ceiling of the Ducal Hall, in the Vatican Palace, as completed after the designs of Bernini. Each spandrel, whether semicircular or triangular, is filled with decorative details designed to fit the space that receives them, and at the same time presents historical or allegorical ideas characteristic of the period. The breaking up of the ceiling into a number of small surfaces renders large realistic or allegorical pictures impractical, but where a domed interior is to be decorated, the soffit of the dome lends a broad surface that can be very satisfactorily treated.

191. In one of the state apartments of the Villa Medici, the four sides of the room are arched over to form a cloistered vault, or square dome. The sides of this dome, if rolled out to form a flat surface on which the design is to be worked out, would present a set of spandrels of the form shown in Fig. 87 (*a*). Each of these sides presents a triangular surface, on which a design must be worked so that its edges will meet the bordering edge of the next triangle to it. The details of one of these designs, as proposed for the Villa Medici, is shown in Fig. 88, and it is characteristic of the style of wall painting of the later Renaissance.

192. Flat ceilings were introduced where the under sides of the floor beams were plastered over and presented an unbroken rectangle the full size of the room. The tendency, however, was to divide these flat surfaces into panels by means of heavy moldings and then decorate the panels with fresco or oil colors, as in Fig. 87 (*b*). The moldings of the panels were not deep and heavy, as was the case with the coffered ceilings, where an attempt at structural effect was made, but served as frames to set off the subjects that the designers wished to portray. Painted decoration was impractical with the coffered ceilings, as the deep beams and girders cut off the light.

193. During the Baroque period, the moldings enclosing these wall decorations became very heavy. They were

FIG. 89

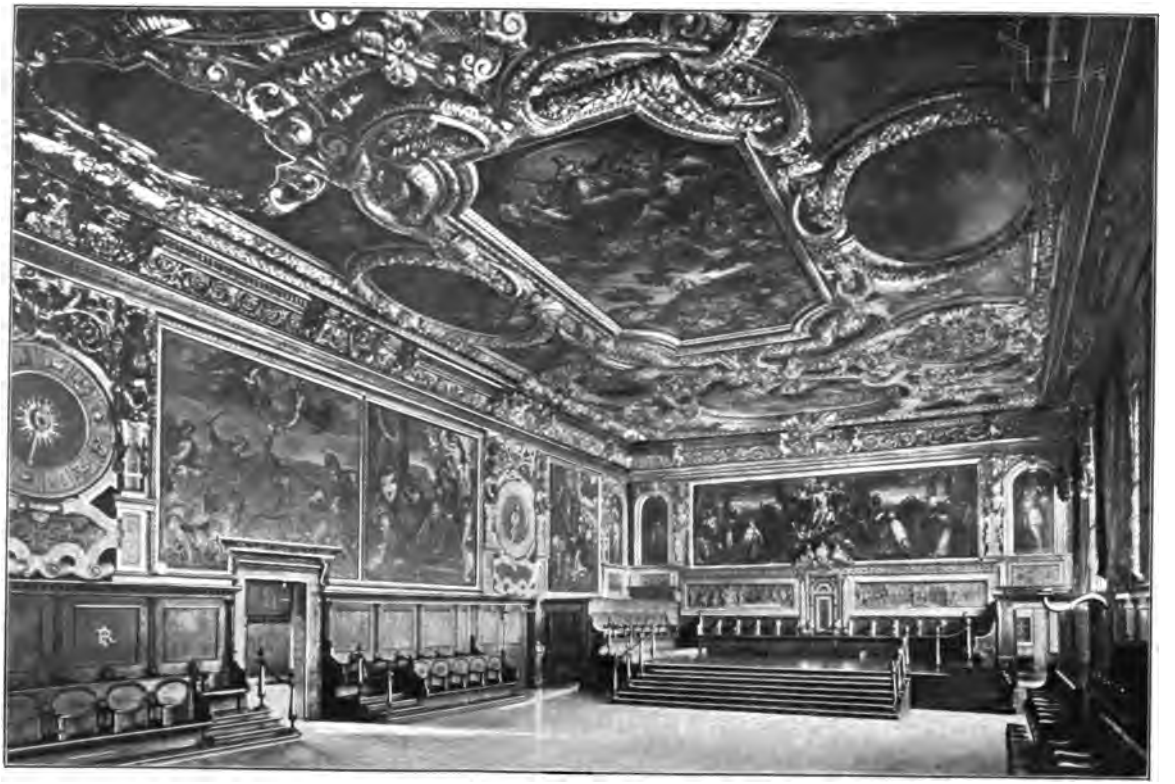


FIG. 90

also richly gilded, giving a most luxurious, though rather bizarre, effect, but thoroughly in keeping with the pompous ceremonies of the day. In Fig. 89 is shown a ceiling in the Riccardi Palace vaulted over an elliptical center. The painting of historical subjects close to the frieze leaves them in a place where they are readily seen, and the lightening of the tones toward the crown of the vault gives a reflecting surface that lightens the gallery and heightens the effect of the apartment. Fig. 90 shows the Senate Chamber of the Ducal Palace, at Venice, the ceiling and side walls of which are painted with elaborate themes by the most noted artists of the period. The frames of these paintings are formed of heavy roll moldings of plaster burnished with gold.

194. During the Late French Renaissance, many ceilings were decorated with plaster moldings and ornaments, and then simply tinted in color instead of receiving elaborate portrayals of allegorical subjects. The ornament and moldings on these partook of the period they represented and harmonized with the other details of the room. Fig. 87 (*c*) shows a Louis XIV design, with a central panel surrounded by moldings and an outer border of light festoons. In England, during the Elizabethan period, molded ceilings became very popular, and the whole ceiling was laid out in irregular panels by means of moldings in low relief, as shown in Fig. 87 (*d*).

Whatever the treatment, care should be exercised that the ceiling decoration be proportioned to its height above the eye, and that it should be lighter in color scheme than the side walls of the room. Large moldings on a low ceiling tend to the feeling of heaviness, and dark-toned ceilings seem low and gloomy. On the other hand, small moldings and delicate decorations on a high ceiling are lost to the eye and produce a feeling of weakness. In a large room, the ceiling is a prominent surface when seen from the end of the apartment, and whatever the treatment decided upon, it should be such that the scheme can be taken in from one point of view without turning around to study it from another point.

MODERN APPLICATIONS

195. In the modern application of historic style, architects are permitted to take considerable liberty with the details of the style in order to fit it to conditions of modern times. In fact, in many cases a mere idea can be worked up according to ancient precedent and then carried out along modern lines, in which there is scarcely any parallel between the modern design and the ancient example that may have given rise to it.

196. A classic design is shown in Fig. 91 (*a*), which illustrates a Pompeian billiard room. The effect here is obtained by dividing the wall into two horizontal bands, the lower one of which is subdivided into broad, red panels. Painted on these panels are graceful figures of dancing girls, similar to those found on Greek vases, while the characteristic Greek fret is used as a border. The upper section of the walls is divided by alternate wide and narrow panels of a lighter tone of red, and, between these, light festoons of flowers are painted under a narrow frieze. The columns are of Roman Ionic, with the lower third harmonizing in tone with the lower side walls and the upper two-thirds rendered as in stone. On the lintel, or architrave, above the capitals, is painted Greek foliated ornament. The chairs and small service tables are pure Greek in design, and the billiard tables are modeled to follow the same lines.

197. In Fig. 91 (*b*) is shown a room in Spanish Renaissance. The effect here is obtained entirely through the color scheme and painted detail, whereas, in the previous example, the columns lent an architectural element that greatly assisted in the effectiveness of the design. The walls are frescoed in red, while the pilasters at the sides of the window openings are painted with Renaissance arabesque against a background of yellow. The upper walls

(*a*)

161 § 49

(*b*)

FIG. 91

(a)

(b)

Fig. 92

(*a*)

161 § 49 (*b*)

Fig. 93

are decorated with the "arms" of several of the Spanish provinces, against backgrounds of green and yellow, and thus contrast most satisfactorily with the red field below. This strong effect of red and yellow, carried out even in the upholstering of the furniture, is what lends the strong Spanish feeling to the design. There is no specific architectural detail that characterizes the style, yet there can be no mistake as to the nationality of the design. This design illustrates how much can be accomplished in a decorative scheme simply by the judicious combination of characteristic colors and the introduction of a few typical emblems.

198. In Figs. 92 and 93 are shown four rooms that are almost identical in form and arrangement, but decorated in different periods. The treatment in Fig. 92 (*a*) is French of the Francis I period. Specifically, there is little to determine this in the design, except the form and upholstery of the furniture and the extreme simplicity of the details. The walls are unbroken by strong horizontal elements, and the spot-and-powder pattern of fleur-de-lis is the only typical French element present. The hangings are extremely simple and well suited to the quiet dignity of the design.

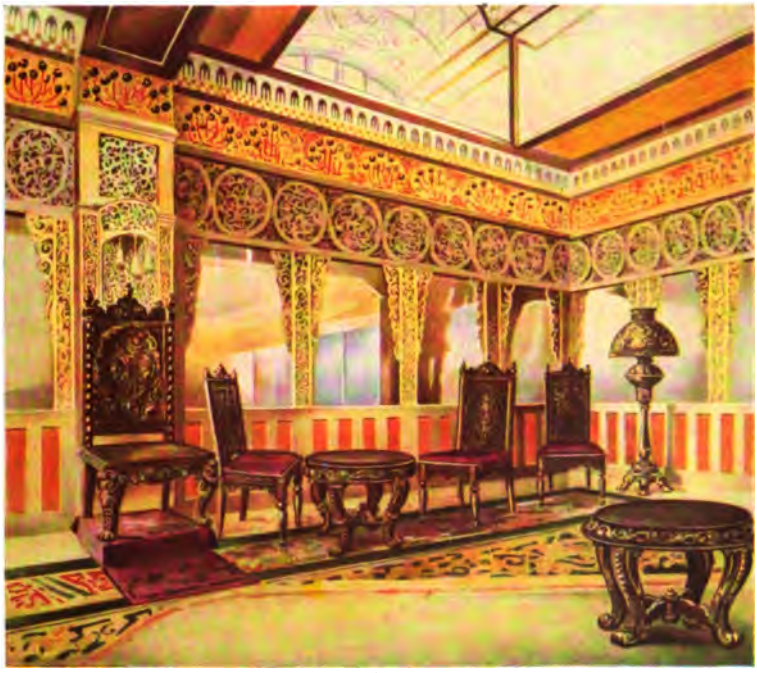
In Fig. 92 (*b*), the decorative treatment, in Dutch Renaissance, is even simpler than that in the previous example. A solid color for the side wall, with a conventional frieze of Dutch landscape, forms a background for the green hangings and characteristic upholstery. The form of the chairs is more Greek than Flemish, and do not seem so much in place as do the heavy sofas and the center table.

In Fig. 93 (*a*) is shown a treatment in the period of Marie Antoinette, while in (*b*) is shown a treatment intended to be Colonial. Here, the furniture alone gives the classification, as either room empty would pass as Colonial. The brocaded wall covering in (*a*) is not more characteristic of the French interior than many of the early American mansions, but the form of the furniture and the upholstery, in simple figured fabrics, leaves no doubt as to the style intended. The Colonial interior, in (*b*), with its chints-covered wall

FIG. 96

161 § 49 FIG. 94

(*a*)



161 § 49 (*b*)

FIG. 95

and furniture and the mahogany pillar table, is so characteristic of the period that there is a feeling of complete harmony throughout the design.

199. In Fig. 94 is shown an American rendering of a design in L'Art Nouveau. This design is completely carried out, not only in the decorations and furniture, but also in the floor covering. The design is an interesting one from the harmony that exists throughout, and though not likely to find extended favor in practical American tastes, it possesses possibilities of development well worthy of study.

200. In Fig. 95 are shown two interiors treated in Oriental coloring. The Chinese effect in (*a*) was obtained through the wall decoration, which is in characteristic designs of the flowery kingdom, and through the introduction of hanging lamps. The rich East Indian design in (*b*) depends entirely on the treatment of the wall surface and the introduction of elaborately carved furniture in natural wood.

201. Fig. 96 shows one of the banquet rooms of the Hotel Astor, in New York. This interior is worked up in the style of a pergola, or a vine-covered trellis, such as were used by the Romans in their villas and gardens. This is an interior room covered with a ceiling, but the beams of the pergola are left exposed and artificial vines are carried over them, so as to give a complete garden effect. The palms and the exotic plants distributed about the room add to this effect and render it a very delightful surrounding for an evening's entertainment. The treatment here is the simplest possible, consisting of Doric columns supporting heavy beams, which in turn support lighter beams of the pergola. The beams of the pergola are in reality the casings of the ceilings above, but the vines are so interwoven between these beams, that the ceiling itself is entirely lost to view. If it were so desired, the ceiling could be so completely covered that it would be impossible to judge from the interior whether or not the room was an exterior one.

This may not be good architecture, but in this age of imitation, social conditions demand such extremes as this,

(*a*)

(*b*)

FIG. 97

and the attempt to carry out such a design to its fullest details is commendable in proportion to the success of the design.

202. In Fig. 97 are shown two views of a subbasement room designed along the lines of the typical German wine cellar. In (*a*) can be seen a long, narrow table with the straight-backed chairs each side, while elliptical wine tuns with richly carved heads are seen on the flanks and in the background. The piers and pillars here are the actual supports of the building above, and they are utilized with the vaults above to carry out the decorative scheme. The entrance to the room is shown in (*b*). Here, the doors are framed of vertical strips, over which great iron hinges are secured with heavy-headed nails. Within the door can be seen a statue of a monk standing against one of the piers. Three of these solemn, and at the same time grotesque, figures flank the approach to the table shown in (*a*), and thus lend much to the effect of the interior.

REVIEW EXERCISES

1. Make three sketches for ceiling treatment in a room 15 ft. × 20 ft. Scale, $\frac{3}{8}$ inch = 1 foot. (*a*) Italian Renaissance, rendered in pencil. (*b*) Louis XV, rendered in wash. (*c*) Oriental, rendered in color.

2. Make four sketches for treatment of a side wall 20 feet long and 10 feet high (with a door opening 4 ft. × 8 ft. in the center). (*a*) In Gothic, rendered in pencil or pen-and-ink. (*b*) In Italian Renaissance, rendered in pencil and wash. (*c*) In Louis XVI, rendered in color. (*d*) In Elizabethan or Queen Anne, rendered in the medium best suited to the design.

3. Make two sets of designs in color for private library or book room, drawing plan of ceiling, side walls with book cases, etc. One set is to be in some suitable historic style and the other to be in a strictly modern treatment.

4. Make four sketches in color or wash of side-wall treatment suitable for bedrooms, using standard wallpaper designs, either wholly or in part of the treatment.

5. Make two sketches for a dining room side-wall treatment, one in some historic style and the other in a modern wallpaper treatment.

NOTE.—In exercises 3, 4, and 5, accessories such as a fireplace, cabinet, buffet, doorway, etc. may be introduced as desired.

HISTORY OF ARCHITECTURE AND ORNAMENT

(PART 1)

INTRODUCTION

ORIGIN OF ARCHITECTURE

1. The history of architecture antedates the written history of all mankind; but we are able to study the characteristics of certain ancient buildings from ruins that still exist, or from their restorations by modern students. From these can be formed a general idea of the habits and customs of races of people long disappeared from the earth.

The history of architecture is a history of the manners, customs, and temperaments of the people, as the buildings of each particular period reflect the social conditions that existed at the time they were erected. Primarily, architecture had its origin in the attempt of man to provide against the inclemency of the weather. At that time there were only three general classes of human beings: the hunter, the shepherd, and the agriculturist.

The pursuits of the first two classes tended to nomadic life, and therefore no permanent residences of these classes are found, the cave and the tent having been sufficient for their purposes. The agriculturist, however, settled where he tilled his land and gathered his crops, and it was he that planted the seed of a community that grew in proportion to the climate of the country, fertility of the soil, etc.

LOCAL INFLUENCES

2. Six specific influences affect each historic style of architecture.

First, the *geographical influence*, which determines the mode of living, and the means of communication and transportation.

Second, the *geological influence*, which determines the quality of the buildings, as the presence or the absence of building stone, clay, or wood will determine whether the buildings shall be of stone, brick, or timber.

Third, the *climatic influence*, which determines the character of the buildings themselves, the size of their windows, and the projection and inclination of the roofs. As, for instance, in tropical countries, under the glaring sun, it is desirable to have small windows and dark, cool interiors, with projecting cornices that will shade the sides of the building from the vertical rays of the midday sun; whereas, in cold countries the roof must be steep to shed the rain and snow, and the windows large to admit the sunshine.

Fourth, the *religious influence*, which will affect the habits and customs of the people.

Fifth, the *political influence*, as the system of government will reflect the manners and temperaments of the influential portion of the nation.

Sixth, the *historical influence*, worked by the traditions and achievements of previous generations.

3. Under all of these six influences, each historic style has been further characterized by one of two systems of construction. The elements of these two systems are the *lintel* and the *arch*. Where all the openings of the wall of a building are covered by a straight beam, or lintel, the system is said to be *trabeated;* and where the openings are covered by any form of arch, the system is called *arched*.

Strictly speaking, all the buildings classified under ancient architecture were based on the principle of the lintel, and all buildings under modern architecture, are built on the principle of the arch, or a combination of the arch and the lintel.

CHARACTERISTICS OF STYLE

4. Each architectural style and period presents certain characteristics that have grown out of the foregoing influences by which it may be recognized and classified. Plans, walls, roofs, columns, openings, and ornament all vary to suit different conditions of civilization, but in the better periods they adhere to certain principles that cause these periods to assume architectural importance in the general history. The dates given are approximately the periods when the most important examples were erected.

5. Ornament.—The term **ornament** is applied to the enrichment, or embellishment, of any object. Ornament should be studied only in its relation to the architectural purpose of the object that it adorns. Ornament should be governed by certain principles and fixed laws, as *fitness* is essential to all good ornament. By fitness is meant its suitability (1) for the purpose for which the object is to serve, (2) for the position the object is to occupy, (3) for the material of which the object is constructed, and (4) for the materials of which the ornament is composed.

Natural forms, when reduced to the four preceding principles, are said to be *conventionalized*, and it should be observed that the best periods of art are those in which the ornament has been most successfully conventionalized.

Ornament may be *flat* (simply on the surface), *incised* (cut below the surface), or in *relief* (raised above the surface).

6. Ornament can be divided into three classes: *constructive*, where it forms a part of the object itself, as a column in a building; *representative*, where it represents some natural form; or purely *decorative*, where it exists simply to please the eye.

In the better periods of art, ornament ever has been symbolic of some geographical, political, or religious idea. Thus, in different decorative schemes, we find the rising sun emblematic of the East, a geographical symbol; the crescent emblematic of the Turkish nation, a political symbol; and the cross emblematic of Christianity, a religious symbol.

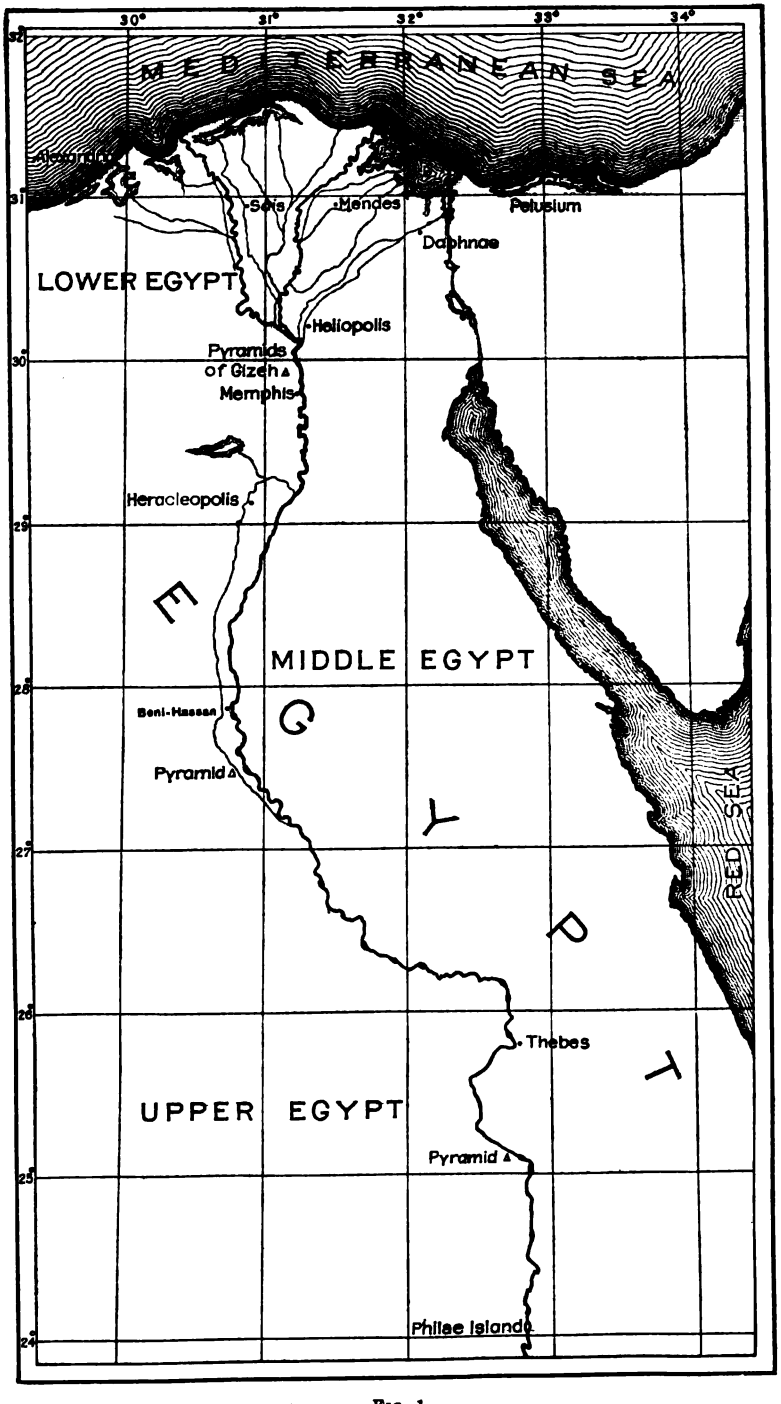
EGYPTIAN ARCHITECTURE

(4000 B. C. TO 200 B. C.)

INFLUENCES

7. **Geographical.**—In Fig. 1 is shown a map of Egypt and the surrounding region that gives an idea of the geographical character of this remarkable country. Along the bank of the river Nile stretches a narrow strip of fertile land, beyond which lies a sandy desert. This narrow strip constituted the entire country of Ancient Egypt. It had easy access to the Mediterranean Sea, to the Red Sea, and through the latter to the Arabian Sea. This geographical position assisted Egypt largely in the days of her greatness, as her products were easily exported, and those of foreign nations easily imported, through these natural highways, while the Nile formed the means of communication throughout the length of the home country. Through its peculiarity of annually overflowing its banks, and inundating the entire land, the Nile rendered Egypt more fertile and productive than any of the neighboring countries. Therefore, the civilization of the old world started on the banks of the Nile, and today we find the remains of ancient tombs and temples stretched from the city of Alexandria to the island of Philæ.

8. **Geological.**—While there were large quarries of limestone in northern Egypt, the central portion abounded in sandstone, and the southern section in granite. To this abundance of lasting building material we are indebted for the preservation of the great monuments of Egypt today. Clay was used to make bricks, but they were simply baked in the sun and entered into the construction of dwellings and buildings of minor importance. A suitable wood was not to be found, the palm and acacia trees being the only ones of importance that grew in this country.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MEDITERRANEAN SEA
Alexandria
Sais
Mendes
Pelusium
Daphnae
LOWER EGYPT
Heliopolis
Pyramids of Gizeh
Memphis
Heracleopolis
E
MIDDLE EGYPT
Beni-Hassan
G
Pyramid
Y
RED SEA
P
Thebes
T
UPPER EGYPT
Pyramid
Philae Island

FIG. 1

9. Climatic.—In Egypt there are but two seasons: spring and summer. Frost and snow are unknown, and rain and fog are very rare. This delightful climate made architectural construction very simple, for, while precautions against heat were ever necessary, inclement weather was never considered.

10. Religious.—The Egyptian religion and its ceremonies were mysterious and complicated, and the expression of this feeling of mystery is one of the distinguishing characteristics of Egyptian architecture. The religion was practically polytheistic, although in theory they recognized but one god. They personified the phenomena of nature, attributing special functions to the sun, moon, etc., and to all animal creation. Hence, we find Egyptian gods represented in the forms of birds and beasts, with emblems of the sun and the moon worn as insignia of their particular power. The Egyptians believed in a highly refined future state, and took more care in the preparation of their tombs than they did of their dwellings. The dwelling house was looked on merely as a temporary lodging, the tomb being their permanent abode, and to this belief is due the existence of such monuments as the pyramids, which were erected as tombs for the emperors.

11. Political and Historical.—Ancient Egypt possessed a vast population, and under the strongest of despotic governments, a multitude of her people were compelled to work on the public monuments for little or no pay. Captives and foreigners were enslaved and put on this work, thus establishing a condition of society that was immensely favorable to the construction of large and important works.

The historical influences are hard to trace but pictorial decorations give us a general knowledge of the characteristic details back to about 4000 B. C. Greek and Roman authors and certain books of the Bible also give us some information.

12. Egyptian architecture is of little importance to the modern designer, but it is of vast importance to the student, as a starting point in the thread of history.

CHARACTERISTICS

13. Primitive Egyptian structures were probably composed of bundles of reeds bound together and placed vertically in the ground to form supports. Across the top were laid other bundles similarly bound, thus forming a skeleton framework that was afterwards filled in with clay. The doors and windows were probably framed of reeds in the humbler dwellings, and of palm trunks in the more pretentious residences. In any case, these dwellings were very perishable, and little remains at the present day in the way of information concerning them.

On the other hand, the public structures of the Egyptians were built with a predominating idea of durability. Immense stone columns, carved to represent conventionalized reeds or painted to suggest their vegetable prototypes, and massive tapering walls, with a hollow, projecting cornice, and incised decorations, suggestive at once of previous clay construction, were the chief characteristics of the later buildings.

Great extravagance of material marks all Egyptian architecture. Stone was quarried and transported in great blocks to the sites of the temples and tombs. Some tombs were cut into the solid rock of the mountain side, while the bodies of powerful rulers were placed within the pyramids, but the preparation of their final resting places was in all cases accompanied by great extravagances of material and labor. All the architecture partakes more or less of a religious character, as the Egyptian thought little of his earthly existence and devoted his life to preparation for the eternity to come. Hence his great care for the permanency of his tomb and the preservation of his body that he might be ready and presentable at the great day of resurrection.

Material was so abundant (see Art. **8**) and labor so cheap (see Art. **11**) that economy of either was utterly unnecessary. Massiveness, grandeur, and the expression of a deep and somber mystery (see Art. **10**) were the ideals of the Egyptian architect and these he readily attained under the geological and political conditions that existed.

FIG. 2

EXAMPLES

14. The existing structures from which the characteristics of Egyptian architecture are to be studied consist almost exclusively of tombs and temples. The pyramids differ in detail from all other structures, but may be generally classed with tombs. The Great Sphinx, although unique as a monument, is only one of the many temples that abound in this mysterious country.

15. Pyramids.—The pyramids form a distinct class by themselves, and present no points in common with any other Egyptian structures. They are of gigantic proportions and were considered by the Greek historians as the first of the seven wonders of the world. The most important pyramids, Fig. 2, are situated on the banks of the lower Nile near Gizeh. Of these, the largest is the Great Pyramid of Cheops, which is shown in Fig. 3. This pyramid was constructed of blocks of limestone, some of whose dimensions are so great that it is a mystery at the present day how they could have been quarried and transported with the primitive tools and machinery in use 3,000 years before the Christian era. The pyramid is about 800 feet square at the base and 450 feet high.

16. Other Tombs.—Besides the pyramids, which were royal tombs, there were smaller tombs for private individuals. The earlier tombs consisted of three parts: (1) the outer chamber, in which were placed food offerings for the deceased, wherein the walls were decorated with festal scenes; (2) the secret chambers, containing statues of the deceased and his family; and (3) the sarcophagus chamber at the bottom of a deep well, in which the sarcophagus, or stone coffin, was laid.

In Upper Egypt occur the rock-cut tombs. These are of little architectural value in themselves, but in some cases present architectural details that may have served as prototypes to later details. The roofs of the tombs of Beni-Hassan, in Upper Egypt, were supported on columns that

FIG. 3

presented eight to sixteen sides, as shown in Fig. 4. These were slightly fluted, and were crowned with a projecting cornice that indicated a derivation from wooden origin.

FIG. 4

17. Temples.—Next to the pyramids in massive grandeur stands the Great Sphinx at Gizeh. This is a statue of the Egyptian god Harmachis and is carved out of solid rock, making a figure 146 feet long, 65 feet high, and 34 feet across the shoulders. The body, which has the form of a crouching lion, is now entirely buried in drifted sand, but the human head, measuring 28 feet from chin to top, and the broad, massive shoulders, are still visible, as shown in Fig. 5. Between the forefeet of the body is excavated a temple in which the god was

FIG. 5

worshipped, and if built at the same time as the sphinx, this temple is the oldest architectural monument on record, as the sphinx antedates the pyramids several centuries.

18. The most important architectural monuments of Egypt were its temples, and the general scheme of arrangement was the same in all cases. The Egyptian temple consisted of a small sanctuary, or *sekos*, that was reached through a large columnar hall known as the *hall of assembly*, or *hypostyle hall*, the latter term meaning roofed over on columns. In front of the hypostyle hall was a large open court, which was surrounded by high and massive walls and was entered between two tower-like front walls, called *pylons*. Flanking the entrance there were sometimes two obelisks each quarried in one great piece of stone, usually bearing hieroglyphical inscriptions. In fact every plain surface in the Egyptian Temples was covered with hieroglyphical ornament of some sort, either incised below the face of the stone or painted in horizontal lines as a written inscription or in a large pictorial subject representing some historical event.

FIG. 6

Each of these parts was varied slightly in different structures, some having two courts in front of the hypostyle hall, known as the outer and the inner court, and in many of the temples the sekos was surrounded by a number of smaller apartments. On the outside of the temple, the entrance was approached through a long avenue—often a mile or more in extent—lined on each side with colossal sphinxes, and occasionally ending in a large monumental gateway advanced before the main entrance to the temple, as shown in Fig. 6. This gateway is called a *propylon*, and it stood alone before

the main entrance like a silent sentinel. The example shown is from the temple of Rameses III, at Karnak, and by comparing it with the surrounding trees, a fair idea of the magnitude of these great architectural details may be obtained. The faces of the propylon were always decorated with elaborate hieroglyphic devices. Hieroglyphs, meaning

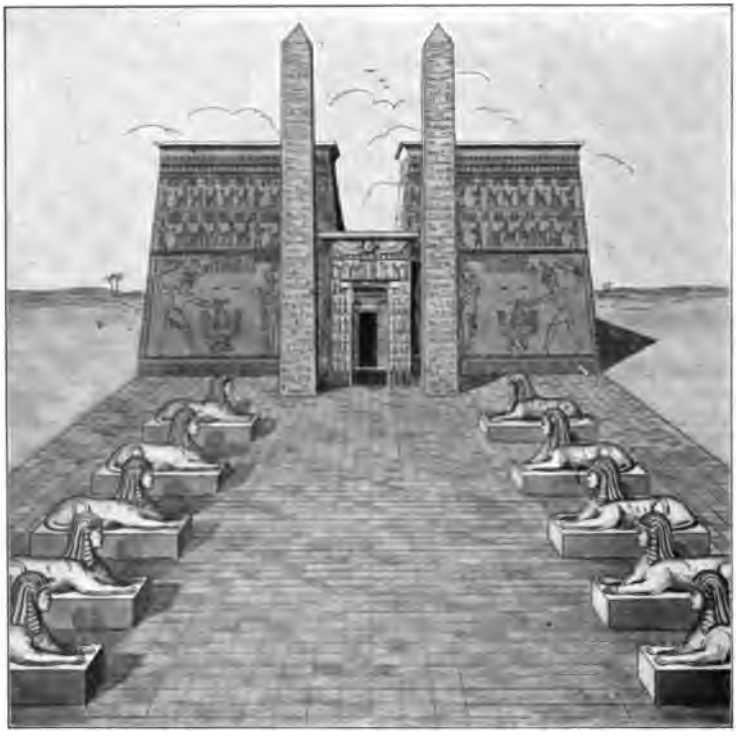


FIG. 7

sacred writings, consist of a series of pictures, or diagrams, illustrating sequent events. Beyond the propylon stand the two great pylons that form the outer front wall of the temple, and the entrance between these two masses is similar in detail to the gateway advanced in front.

A better idea of this arrangement can be obtained from Fig. 7, which shows a portion of the avenue, the entrance,

and pylons of the temple of Edfou, in Upper Egypt. In this case the propylon is omitted, but its form is duplicated as an entrance, and at the end of the long avenue of sphinxes stand two great obelisks—one on each side of the entrance. The walls of the pylons themselves are decorated with hieroglyphs, the design at the bottom representing a group of prisoners about to be executed by the king.

19. On the inside of the temple, these pylons were sculptured in much the same manner, although the lower part of

FIG. 8

them was largely covered by a roofed passageway around the edges of the court. Fig. 8 shows the appearance of these pylons on the inside, and a portion of the columns supporting the roof on the right side of the court. This example is taken from a temple on the island of Philæ in the upper Nile. The pylons were massive structures, and contained, in their interiors, a number of secret rooms accessible only to the priests and members of the royal family.

An entrance to the interior of one of the pylons is shown on the left. The general treatment around the door and

over it is precisely the same, but on a smaller scale, as the main entrance to the temple and the general character of the propylon illustrated in Fig. 6.

A better idea of the massiveness of these pylons may be obtained from Fig. 9, which is an illustration of the temple of Edfou, showing the taper of the walls from the ground upwards, a characteristic of all Egyptian architecture. This illustration is taken from above the side walls of the temple,

FIG. 9

so that the columns at the entrance of the hypostyle hall at the rear of the court may be seen.

20. In Fig. 10 is shown the plan of the Ramesseum, a temple built by, and named after, Rameses, who was king of Egypt about 1500 B. C. Here the sanctuary is shown at *a*, surrounded by a number of smaller apartments that were used by the priests and members of the royal family, both as places for their mysterious devotions and as royal residences, the king and his immediate relatives being considered earthly representatives of the gods. The sanctuary contained the shrine, and was entered through either of two portals, one from the hypostyle hall *b*, and the other

communicating with one of the sacred apartments. The roof of the hypostyle hall *b* was supported by two sets of columns,

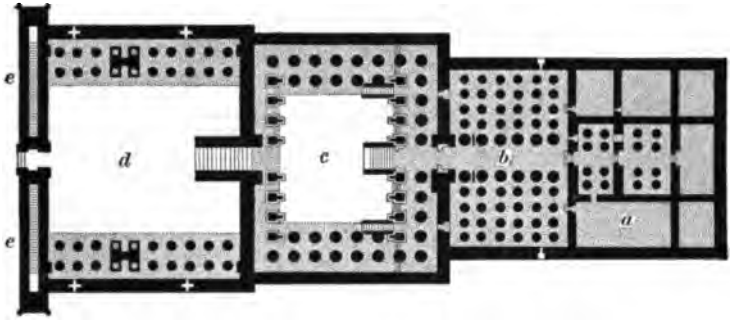


FIG. 10

the central ones being longer than those on each side, in order to provide a clearstory for the admission of light and air.

This is more clearly shown in Fig. 11, which was photographed from a model of the great hypostyle hall at Karnak.

FIG. 11

At *a* is shown the double row of tall columns, which are connected longitudinally by the stone lintels *b*, in order to receive

the edges of the stone slabs *c*, which form the roof over the *nave*, or central portion, of the temple. On each side of the columns *a* are the shorter columns *d*, which are connected transversely by the lintels *e*, and the inside row, longitudinally by the lintel *f*, to support the roof slabs *g* in the same manner as over the nave. An open space *h* is thus left to admit light to the interior of the hall and to form a clearstory similar to the same detail in the cathedrals erected in Europe many centuries later.

21. This system of supporting the roof is based on the first of the two principles of construction previously referred to, namely, the *lintel*. The spacing of the supports being governed entirely by the length of lintel the builders were able to quarry, the columns are exceedingly close together, and this is the case not only in Egyptian structures, but in all architectural edifices in which "the lintel system of construction" prevails. For this reason, large apartments were never entirely roofed over, but were open to the sky, either wholly or in part, as shown at *c*, Fig. 10, where the shaded portions indicate the covering roof.

The space shown at *c* is the inner court of the temple, from which the hypostyle hall must be entered. On each side of this inner court is a double row of columns supporting a roof extending from the side walls, while at the back is a single row of columns and a row of square piers that carry a portion of the roof extending over from the hypostyle hall. Another row of square piers carries the roof over the front end of this inner court, which, with the other partial coverings, surrounds the court with a narrow, projecting roof on all four sides.

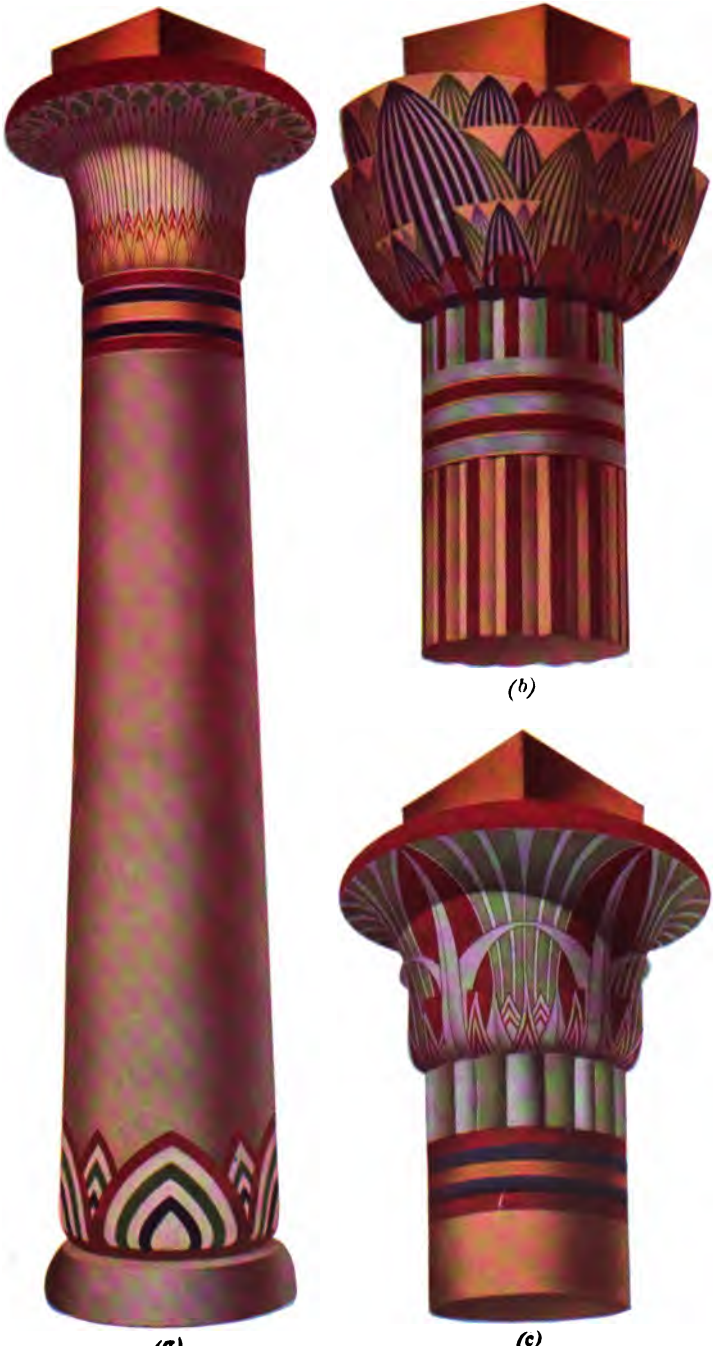
22. The effect of this treatment, which was imposing in itself, was enhanced by colossal statues carved on the faces of the square piers. Three flights of stone steps led to the level of the hypostyle hall, the floor of which was considerably above the level of the inner court. Flanking the steps of the inner court *c*, and against the square piers that support the roof were colossal carved-stone images of

17 FIG. 12

Egyptian deities. It is a striking characteristic of Egyptian architecture and sculpture that everything shall be on a colossal scale. This characteristic is carried out in the pyramids, the sphinx, and in the colossal statues of Memnon, Fig. 12, on the north bank of the Nile at Thebes. These figures inspire one with awe simply by their magnitude, and as adjuncts to the complex ceremonies of the Egyptian religious rites must certainly have impressed the people with the insignificance of mere man. The entrance court *d* was a comparatively plain enclosure, with columns on each side and a single flight of steps leading up to the floor of the inner court. This court was entered through a narrow portal flanked on each side by the massive pylons *e*.

FIG. 13

23. Obelisks.—The obelisks in front of a temple as at Edfou, Fig. 7, are characteristic of Egyptian art. The example in Fig. 13 is one of a pair of obelisks known as "Cleopatra's needles," and is shown as it stood in the city of Alexandria, for nearly 2,000 years, with its companion, before the entrance of the temple at Heliopolis. It is 67 feet high, and 7 feet 7 inches square at the base. It was removed to Alexandria by the Roman emperor Augustus just before the beginning of the Christian era. In 1878 this obelisk was transported to New York, where it now stands on a mound in Central Park.



(a) (b) (c)

161 § 50

FIG. 14

ANALYTICAL STUDY

PLANS

24. Egyptian temples were planned entirely for interior effect. The dimly lighted hypostyle hall was a forest of columns, producing a deep feeling of grandeur and mystery. The temples were not always symmetrical, and being erected at irregular intervals, they expressed the ideas of different generations quite as much as do the cathedrals that were erected centuries later. See Fig. 10.

WALLS

25. The buildings were surrounded by walls of tremendous thickness that were usually built of granite. The faces of the walls sloped inwards, and the tops were surmounted by a massive concave cornice over a rolled molding, as shown at the top of the propylon in Fig. 6.

ROOFS

26. The roofs consisted of massive flat stones, supported on lintels between the columns, as shown in Fig. 11.

COLUMNS

27. The columns were thick and massive, their height seldom being more than six times their thickness. Five general designs were used, all derived from some conventionalized form of the lotus, papyrus, or palm. The earliest columns were square or polygonal, as in the tombs of Beni-Hassan, Fig. 4. Subsequently, they became round, tapered toward the top, and spread out into an enormous bell-shaped capital that supported the roof. They were carved and painted to represent the full blossom of the papyrus or palm, as shown in Fig. 14 (*a*) and (*c*), or to represent the lotus blossom, as at (*b*). The edge of the shaft at the bottom was sometimes

rounded off and decorated with a pointed ornament representing the large leaves around the sprouting lotus, above

FIG. 16

which the top of the column would be contracted to form a conventional lotus bud under a square block, as shown in Fig. 15 (*a*). Occasionally, as at Karnak, Fig. 11, the entire column was decorated in color with hieroglyphs, as shown in Fig. 15 (*b*). The corners of the four- and eight-sided columns were sometimes rounded off, while the plain sides were reeded, thus giving the appearance of a bunch of stems, which were ostensibly held in place by a number of bands, as shown in Fig. 15 (*a*).

FIG. 17

28. Another form of column had the upper portion designed to represent a *naos*, or cell, similar to the sanctuary, with a miniature entrance and pylon on each side, under which were carved heads of Hathor or Isis, two prominent deities in Egyptian mythology. These columns are known as *Hathor-headed* or *Isis-headed*, as the case may be, and are as shown in Fig. 16, which illustrates a portion of the temple of Hathor at Dendarah. Fig. 17 shows a restoration of one of these columns, from which the details may be more clearly understood.

(a) (b)

161 § 50

FIG. 15

In the architecture of Egypt, there were no established rules of proportion. The height and projection of the capital bear no fixed relation to the length or diameter of the column, as do these details in later architectural styles, and the construction being almost entirely of stone, the columns were placed very close together, so as to receive the lintels and slabs that formed the roof.

OPENINGS

29. The openings were uniform, in general style, and resembled the propylon in general treatment. Windows were rare, as the clearstory (see Fig. 11) admitted sufficient light for the mysterious rites that were performed in the temples.

MOLDINGS

30. Small decorative details called **moldings** are used to separate architectural members in a building. They consist of plane or cylindrical surfaces run in bands vertically or horizontally. In Egyptian architecture, there are few moldings, but each is thoroughly characteristic of the style. The principal ones are the large concave member crowning the walls of the temples and pylons, Figs. 6 and 7, and the smaller roll, or band, separating this crowning member from the lower wall.

ORNAMENT

31. Egyptian ornament was symbolic and an important factor in the architectural style. It was represented in all three classes, based on few types, and in many cases is so conventionalized that the type cannot be determined.

It is of importance that the student should thoroughly understand the difference between *style*, *class*, and *type*. The term **style** is used to indicate the period or nationality of the ornament or architecture, as the Egyptian style; the term **class** is applied when it is desired to indicate a subdivision

of some style, as the constructive class of Egyptian ornament; and the term **type** is used to refer to the natural form from which the ornament is derived.

32. Types.—The types derived from the vegetable kingdom were the lotus, papyrus, and palm. The most conspicuous type in Egyptian art is the **lotus**, a plant growing on the banks of the Nile and somewhat resembling the pond lily, but differing from it in coloring. It stands high out of the water, as shown in Fig. 18, with petals of a rich purple and a heart of deep orange. The lotus was a sacred flower, and as an offering to the gods was conspicuous in the highest forms of worship.

FIG. 18

In each architectural style, some one particular vegetable type seems to stand out conspicuously in the decorations. In Egypt, the lotus was used in a multitude of different forms in almost every decorative scheme throughout its history. In fact it is difficult to conceive a characteristically Egyptian design that does not introduce some suggestion derived from this flower. The devotion of the Egyptians to this particular emblem amounts almost to worship. It was painted on their walls, mummy cases, and coffins; it was carved in their monuments, temples, and tombs; it was wrought in precious metals and worn as jewelry; it was woven in their linen garments, and in fact it was everywhere.

The **papyrus plant,** shown in Fig. 19, was also used largely in Egyptian art; it was associated with the Nile, on whose banks it grew, but not to such an extent as the lotus. It was the first material used to manufacture paper, which derives its name from this plant.

Fig. 19

Feathers presented another type frequently met with in ornament, and these, with some birds, particularly the vulture or buzzard; the asp, a small, venomous serpent; and the beetle, were about all the types borrowed from the animal kingdom.

33. Winged Disk.—The ornament known as the **winged disk,** Fig. 20, consists of a solar disk, supported on each side by an asp, the royal symbol of Upper and Lower Egypt. The wide outstretching vulture's wings symbolize the untiring activity of the sun in its beneficence; hence, a divine protecting

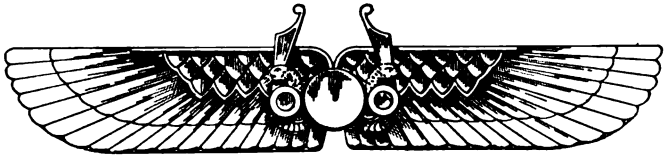


Fig. 20

power. It is sometimes varied to include the figure of a goddess or the body of a vulture, in place of the disk, and the wings are occasionally curved upwards.

34. The Scarabæus.—The **scarabæus**, Fig. 21, consisted of a beetle holding a sun disk between its front feet and a small ball between its hind feet. It was identified with the rising sun, and was emblematic of creation and resurrection, or new birth. Its exact significance is somewhat complicated, as are in fact all Egyptian emblems; but, owing to the habits of the beetle, slowly developing from a grub through various stages to a full-grown insect, it is emblematic of progress and evolution.

FIG. 21

35. Wall Decorations.—The **wall decorations** usually consisted of hieroglyphic representations of some historical event. In private tombs, the life of the occupant was represented, and in temples, the life of the gods or the history of the nation was depicted. Each representation was not only a detail of the wall decoration, but a hieroglyphic record of a fact. Sometimes it was carved in the surface of the walls, and sometimes merely painted; and, occasionally, it was both carved and painted. It was always most conventional, and certain details, such as the lotus and papyrus, were represented in the strictest geometrical arrangement, usually showing the bud, blossom, and fruit in regular order, typifying the development of the entire plant.

FIG. 22

In Fig. 22 observe the straight, stiff stem and trumpet-shaped blossom, the sharp-pointed petals of the calyx, and the geometrical arrangement of the entire plant, with all its distinguishing characteristics emphasized to produce the simplest and severest conventionalism.

Egyptian carved ornament of this character is nearly always in low relief, and is sometimes merely incised or outlined in the surface of the wall, as shown in Fig. 23.

On work executed in a later period, the background is sometimes cut away, leaving the carved ornament in full relief, as shown in Fig. 24.

In Figs. 25 and 27 are shown several characteristic wall decorations, wherein the lotus, papyrus, and other types are introduced in great variety, showing the changes that can be worked on a few ideas. These were introduced in the decorative schemes of the tombs and temples, and give a fair idea of the general wall treatment.

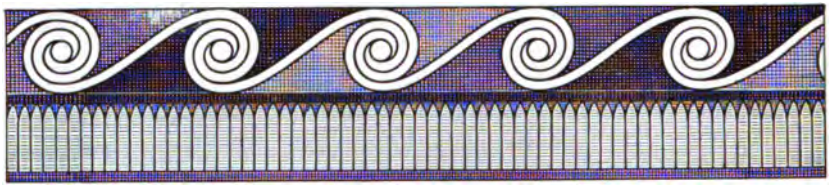
FIG. 23

FIG. 24

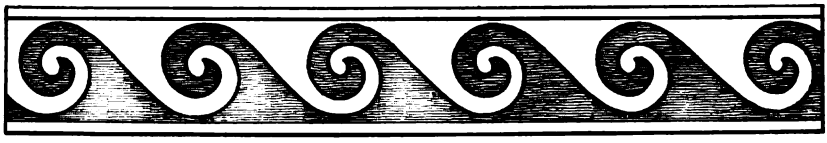
The scroll borders at (*a*) and (*b*), Fig. 25, represent conventionalized waves of the Nile, and were frequently used in a multitude of forms as borders, or frames, to wall panels filled in with surface ornament.

The border shown at (*f*) is taken from a narrow frieze in one of the tombs. The lotus is here used in two forms, with a geometrical arrangement above and below. Another border generally used in a vertical position is shown at (*g*). Here, the lotus blossom is introduced in the central strip, which is flanked on each side by a series of disks.

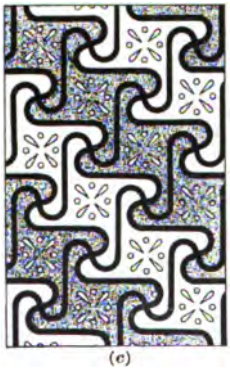
At (*c*), (*d*), (*e*), and (*h*) are shown forms of surface decoration that were used within the panels surrounded by the



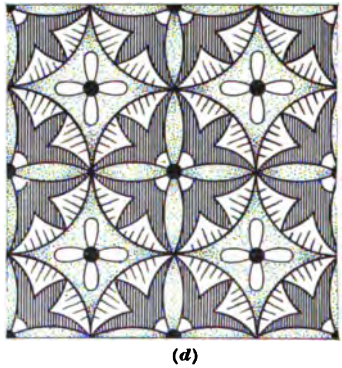
(*a*)



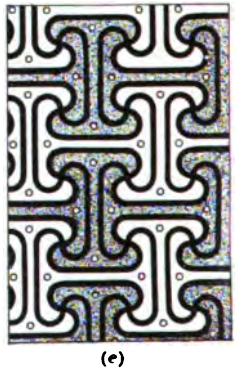
(*b*)



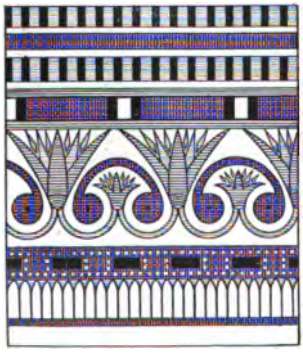
(*c*)



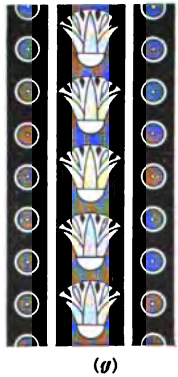
(*d*)



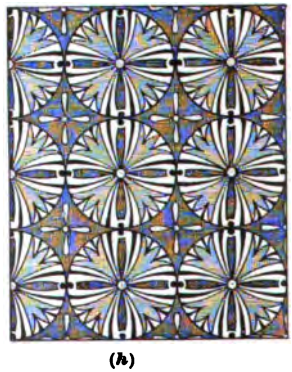
(*e*)



(*f*)



(*g*)



(*h*)

FIG. 25

preceding and many other designs of borders. No type is traceable in (*c*) or (*e*), but in (*d*) and (*h*), the conventionalized lotus blossom is used four times in each circle. Egyptian surface decoration was always geometrical. The minor subdivisions were always circles, squares, spirals, triangles with straight or curved sides, or an interweaving of straight and curved lines, as in (*c*) and (*e*). Wall decorations treated in this geometrical manner are called **diapers**, and are found in all periods or decorative art.

36. Rosette Forms.—The **rosette forms** shown in Fig. 26 are some of the many observed in Egyptian ornament. At (*a*) is shown a simple circle with an inner circle, and the space between them is divided by straight lines into eight equal parts. The transition from this form to the form shown at (*b*) consists merely of a notching of the edge of the outer circle where the lines intersect the circumference; (*c*) is the same as (*b*), except that the dividing lines are arranged in pairs, thus making each segment independent and by itself. From (*c*) to (*d*), the segments are made narrower, until they are very nearly the size of the spaces between them, and at (*e*) the extreme limit is reached. Here, what might be considered the pet: .s of the floral device are separated from the center and from one another entirely, and become independent elements of the design.

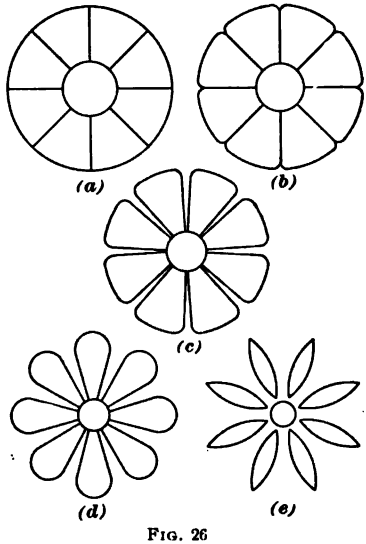


FIG. 26

37. The diapers and borders shown in Fig. 27 give some idea of the color combination used by the Egyptian artists. Here are found the same types that characterized all Egyptian ornament, but used in many different ways,

which give variety and charm to successive combinations of the same details. At (*a*) and (*b*) the predominating types are the spiral and the lotus blossom and rosette combined with the scarabæus in one case and a hieroglyphic inscription in the other; yet similar as are these elementary details, the decorative effect is entirely different. At (*c*), the spiral lotus and the rosette are again combined, and another design totally unlike the preceding is the result. Although the spiral is the only prominent element evident in (*d*), the inclosed form is undoubtedly derived from the papyrus. The border decoration shown at (*e*) is composed entirely of lotus buds and blossoms, arranged alternately. These are only a few of an almost endless variety of wall decorations based on these simple characteristic types.

There is a sharp distinction between what is termed diaper treatment and wall painting. The former consists invariably of small, geometrical subdivisions presented in a repeating pattern in all directions, while the latter term is applied to large surfaces treated in a pictorial manner, and not repeating in design.

38. Wall Paintings.—In Fig. 28 is shown a painted wall ornament from the tomb of Seti I. It represents the "sacred bark," the ceremonies connected with which were an exceedingly complicated but important branch of the religious devotions of the priests. This device frequently appears in the sculpture and paintings of the tombs, and usually represents the funeral of one of the gods. Everything is arranged in a most orderly manner, as will be observed, and every detail is placed to convey a certain significance. It would be impossible here to go into all the explanations connected with Egyptian hieroglyphic ornament, but this illustration is sufficient to show the general subdivision of the walls and the completeness of the illustrated idea.

The civilization of Ancient Egypt presents nothing in common with that of the present day and the Egyptian style therefore finds little application in modern architectural constructions.

(a)

(b)

(c)

(d)

(e)

161 § 50

FIG. 27

Occasionally it is used in the design of a tomb or of a building devoted to Masonic or other secret society rites.

FIG. 28

Then its application is appropriate either on account of its historical associations or its suggestion of mystery.

REVIEW EXERCISES

1. What does the term conventionalized mean?

2. What is the distinction between the terms: (*a*) style, (*b*) class, and (*c*) type?

3. What influences must be taken into consideration in studying an architectural style? Describe the effect of each.

4. For what modern application is the Egyptian style suitable?

5. Make a design in color for a wall diaper in the Egyptian style, using the types herein described, or other ones similar to them, but not a copy of the illustrations. The design should be not less than 6 in. × 6 in., and should be made on a sheet of white drawing paper 9 in. × 12 in. The design need not be entirely colored, but a section of it should be completed to show the scheme and coloring.

6. Make a design in color for a column in the Egyptian style, but do not copy it directly from any illustration; or, make a drawing of a propylon similar to Fig. 6, but complete it with all details restored and colored and hieroglyphics incised, as shown in Fig. 23. The design is to be 10 inches high on a sheet 9 in. × 12 in.

ASIATIC ARCHITECTURE

(2000 B. C.)

INFLUENCES

39. Geographical.—The map, Fig. 29, shows a portion of Western Asia including the valley between the Tigris and Euphrates rivers. The land watered by these rivers was very fertile, and the country between them, known as the plain of Mesopotamia, was irrigated by canals extending from Babylon to the city of Nineveh.

Civilization in this country started at the mouth of these rivers, where they emptied into the Persian Gulf, and spread toward their sources, just as Egyptian civilization formed along the Nile. In Western Asia, however, civilization spread toward the north, while in Egypt it spread toward the south.

40. Geological.—This entire section, with the exception of Assyria, possessed no stone and grew very little vegetation of the character suitable for building materials. The soil was alluvial and readily baked into bricks, which formed the principal building material. Sun-baked bricks were used for the body of the walls, while tile, or kiln-burned bricks, were occasionally used as a facing. In Assyria, however, some stone was used, and the inside and outside facings of the walls were finished with either alabaster or limestone slabs, on which were carved allegorical figures in low relief. These carvings and the inscriptions on the stones are of vast importance historically, as they convey much information concerning the character of the buildings of the period, although the buildings themselves have long since crumbled away.

41. Climatic.—In Chaldea, the country was swampy and unhealthy, and the entire region was infested with

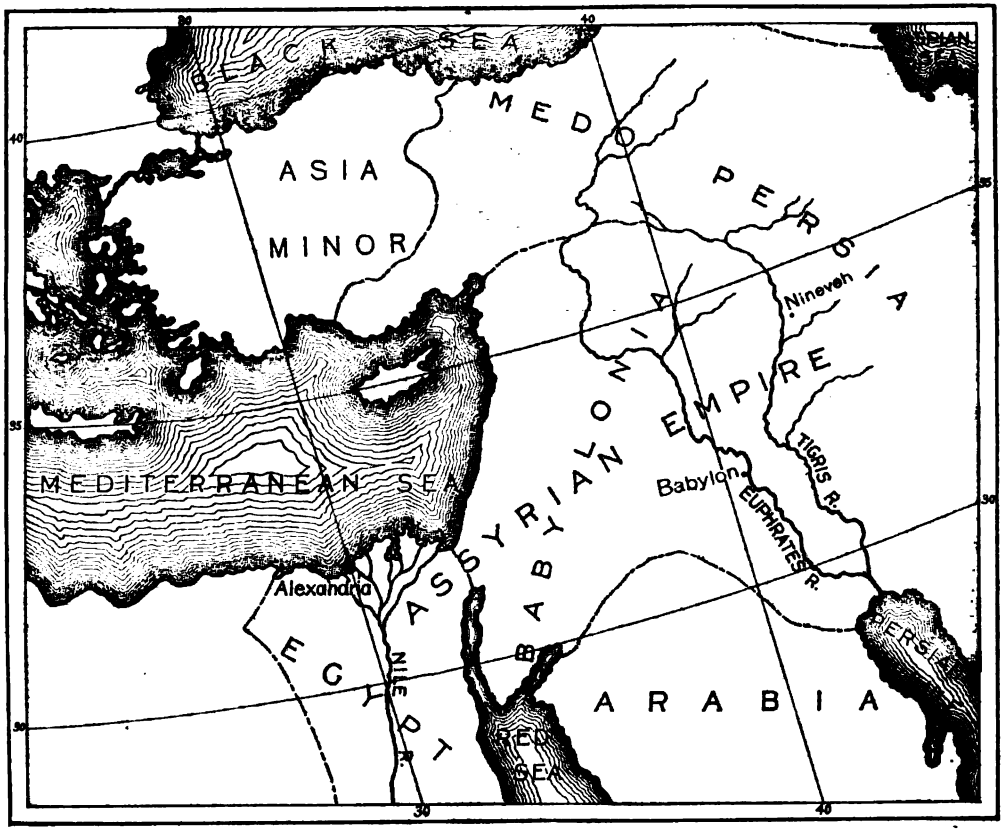

BLACK SEA
ASIA
MINOR
MEDO
PERSIA
Nineveh
ASSYRIAN EMPIRE
BABYLONIA
Babylon
TIGRIS R.
EUPHRATES R.
MEDITERRANEAN SEA
Alexandria
EGYPT
NILE R.
RED SEA
ARABIA
PERSIA
INDIAN
40
35
30

FIG. 29

venomous insects, so that in the cities it was necessary to construct all buildings on platforms so as to prevent insects and reptiles from crawling into them. During the rainy season, too, there were heavy floods near the rivers, rendering it further necessary to raise the communities above the annual inundations. In Persia, however, there was a high plain, and there this elevated construction was not required.

42. Religious.—The people of this section were extremely superstitious. They worshiped the sun, the moon, and the powers of nature—fire, wind, thunder, etc. Temples and images of gods were not common among them, as their sacrifices to the sun and other celestial bodies were made in the open air. The entrances to their palaces were guarded by ferocious-looking stone bulls with human heads, Fig. 30, that represented some genius or beneficent power emanating from their ideas of deity.

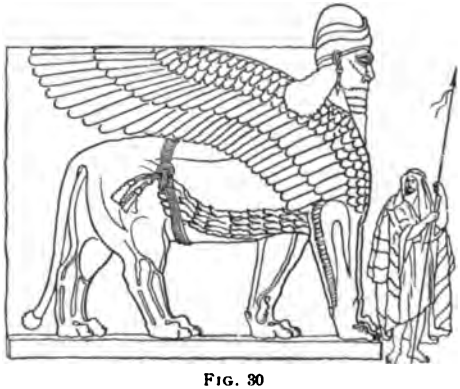


FIG. 30

43. Political and Historical.—The sculptures and carved inscriptions give a very clear idea of the character of the people and customs of the period. The inscriptions were formed in a peculiar kind of wedge-shaped characters, called *cuneiform*, and records were made by pressing small wedge-shaped devices into the soft clay before baking it into bricks. Instead of paper, small tiles and tablets were used for recording facts, and so much in this form and character was written that large libraries were formed, the books of which consisted of burnt tiles.

44. The history of this section can be determined only by the translation of the cuneiform characters, which, up to

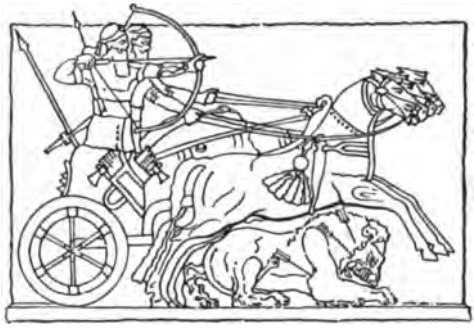
the present time, has only been imperfectly carried out. The earliest king mentioned in the cuneiform inscription reigned 4500 B. C., and the kingdom established extended north, along the valley of the Tigris. About 1700 B. C., however, Assyria asserted her power over the rest of the empire and became a ruling influence in Western Asia. An Assyrian king named Sargon defeated the Egyptians and the Philistines, who were allied with them, and occupied Egypt. This may have introduced Egyptian influences into their architecture. About 672 B. C., the Egyptians conquered the Assyrians and shook off their yoke. Nineveh was destroyed in 609 B. C., and the Assyrian kingdom was divided. Babylon became the leading city until taken by the Persians in 539 B. C. The country remained under the rule of the Persians until 333 B. C., when it was taken by the Greeks under Alexander the Great. Thereafter its history is merged with that of Greece.

EXAMPLES

45. The only buildings of which a vestige is left at the present day to enlighten us to the art of Western Asia, are the palaces. The civilization of the valley of the Tigris and Euphrates rivers was next in antiquity to that of Egypt, but was far inferior to that country in art and architecture. The subjects of the two kingdoms—Chaldea and Assyria—that ruled this valley differed widely in character and culture, but the lack of good building material and the flatness of the country imposed on both nations similar restrictions of conception, form, and material. Not a tomb nor a temple of these ancient nations stands today to enlighten us on the details of their system of construction, but the remains of their palaces, especially those of Assyria, show a scale of magnificence that is simply astounding, though these palaces were erected of brick, the poor quality of which prevented the builders from carrying their structures to any great height.

Elevation above the level plain of the valley was attained by first erecting immense terraces, or mounds, which were

faced with stone slabs or hard-burned bricks, and on these mounds buildings of moderate height were constructed. The absence of stone suitable for columns, and the difficulty of procuring beams of long span, made broad halls or large, covered rooms practically impossible, although, unlike the Egyptians, they used the arch to span the principal openings, and it formed an important element in their style. The plans



(*a*)

(*b*)

FIG. 31

of these palaces, therefore, consisted of a series of long corridors and small cells. The interior walls were wainscoted to a height of 8 or 9 feet with alabaster slabs richly carved in low relief to represent hunting scenes, battles, tribute to the kings, and glorification of the gods, as shown in Fig. 31. Plastered walls were painted in brilliant colors, and every art known to these people was employed to make their palaces a maze of richness and architectural splendor.

46. The system of construction was simple. The clay walls, faced with alabaster slabs, enameled tile, or hard-burned bricks, were roofed over with cedar beams, and the roofs were paved with tiles to form terraces or roof gardens. These are referred to in ancient writings as the "Hanging Gardens of Babylon." Light was admitted through small windows close to the ceiling, and usually certain rooms in the interior of the palace were entirely windowless. Even at the present day the inhabitants of these districts take refuge from the torrid heat of the summer midday in windowless apartments, lighted only by lamps. Above the wainscots that line the courts and corridors were wide friezes of enameled brick, richly ornamented with various symbolic forms, used as decorative motives. Of these the most frequent were the "sacred tree," Fig. 32, the winged bull, Fig. 30, and other mythological monsters, together with palmettes or fan-shaped floral designs, and the lotus blossom. The latter, which were used largely around the archivolts over the arched entrance gates, were probably derived from Egypt. The most characteristic details, however, were the winged bulls. Though of tremendous proportion, every part was minutely wrought, even to the details of the head-dress, the hair, the feathers of the wings, and the anatomy, as shown in Fig. 30. The worst feature of the Assyrian constructions was their perishable character. With columns and roofs of wood, covered with several feet of earth to keep out the heat, and walls of simple clay—the ravages of time caused their identities to become buried in their own materials.

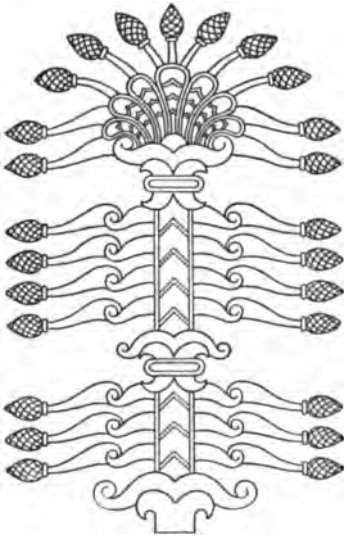


Fig. 32

ANALYTICAL STUDY

PLANS

47. Assyrian palaces were planned with open central courts and long, narrow rooms and halls. They were raised on platforms, or terraces, from 30 to 50 feet in height. Egyptian temples were planned solely for interior effect, while Assyrian palaces were designed for both interior and exterior effect.

WALLS

48. The walls of the Assyrian palaces were constructed of brick and were faced with stone slabs, whereas the walls of the Egyptian temples were of solid granite. In Assyria, the brick walls alone remain, the columns, which were of wood, having long since perished. In Persia, the walls, which were thin, have crumbled away, but the massive blocks that flanked the openings, the immense stone columns, and the marble stairways still remain.

ROOFS

49. The roofs consisted of wooden beams supported on wooden columns, and clay walls tiled over on the outside. The more important rooms were arched over, or vaulted, with brick; whereas, in Egypt, the roofs were invariably of stone slabs supported on stone lintels.

COLUMNS

50. In the earlier periods, the columns were made of wood, but in the later periods some of them were built of stone. The most ancient cities, being in Chaldea and Assyria, where there was no stone, possessed buildings only of wood and brick or tile. However, when the Persians returned from Egypt, they built at Persepolis, where limestone abounded,

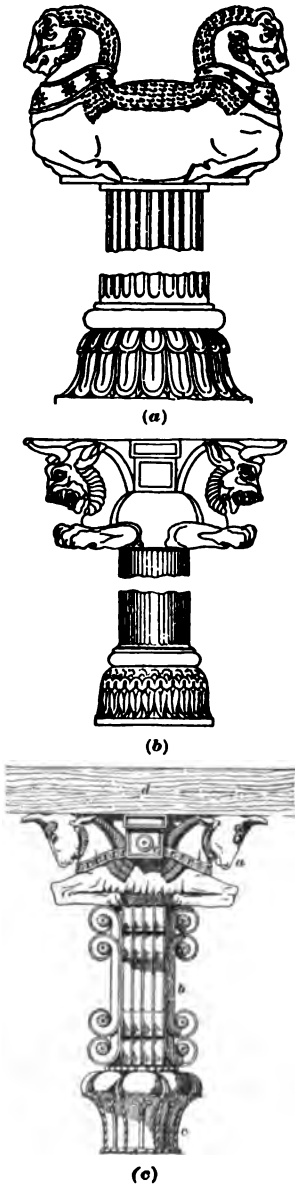


FIG. 33

columns of stone to support the roofs of their palaces, tombs, and temples. The capitals of these columns were characteristic, and consisted of the double horse, double bull, double unicorn, double griffin, etc., under which a scroll device was sometimes introduced as shown in Fig. 33 (*c*). The capitals (*a*) and (*b*) are placed abruptly on top the shafts without any intervening moldings or preparation, but in (*c*) the top of the column has been varied to present a transectional condition from the round reeded shaft to the animal from above. The beams of the roof rested on the heads of the animals in one direction, as shown at (*c*), and on their backs and between their heads when running in the opposite direction, as shown at (*b*) and (*c*), while different animal forms were used for the capitals in different cases, and some were supported on scrolls while others were not, the bases were almost universally of the type shown in (*a*) and (*b*). The scrolls shown at (*c*) are interesting owing to the later appearance of a similar device in Greek capitals; some of the Assyrian sculptures show the scroll device in a horizontal position across the top of the column, but no examples of that form exist in the structures of which sufficient material remains to study from.

OPENINGS

51. The temples were lighted by means of a clearstory similar to that in the Egyptian temples, but the palaces depended more on their doorways to let in a flood of light where necessary, and consequently they made these openings of enormous size.

MOLDINGS

52. As in Egypt, the architects of Western Asia made little use of formal moldings. Plain sinkings were used in the bases and capitals of the columns, with an occasional projecting rib or incised groove.

ORNAMENT

53. The ornament of Assyria was probably borrowed from Egypt, as there are many points of resemblance in the two styles. The sculpture of the Assyrians seems to have been a development of that of the Egyptians, but descended rather than advanced in scale of perfection. Egyptian sculpture degenerated toward the end of the 4th century B. C., as it expressed an unnatural swelling of the limbs that was at first only lightly indicated but gradually became almost exaggerated—the conventional having been abandoned for an imperfect attempt at the natural. In Assyrian sculpture, the attempt was carried still further, and, while the general arrangement of a subject and the pose of a single figure were still conventional, an attempt was made to express the muscles of the limbs and the rotundity of the flesh to an extent that destroyed the conventionalism of the whole. In all art, this is a symptom of decline. Nature should be idealized, not copied.

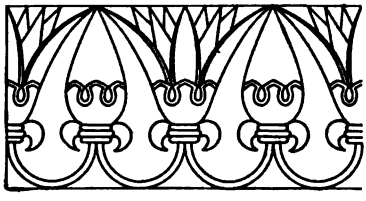


Fig. 34

Assyrian ornament is not based altogether on the same types as the Egyptian, but is represented in the same way.

In both styles, the ornaments appear in relief, as well as painted, in the nature of hieroglyphic diagrams. With the exception of the pineapple, and the adaptation of the Egyptian lotus, which is shown in Fig. 34, Assyrian ornament does not seem to be based on any natural type.

54. The religion of the Assyrians differed widely from that of the Egyptians, and, although their combinations of

FIG. 35

forms somewhat resemble certain of the Egyptian deities, the style in which they sculptured them was below the standard of art and practice in Egypt. In Fig. 35 is shown an example of this work representing the winged deity Asshur, in which may be seen the excessive effort to represent the rotundity of muscular developments just mentioned. The attempt to represent the muscular characteristics of this

figure is exceedingly inartistic, and, although the attempt to present an appearance of power and strength is well carried out, it is done with much less delicacy and refinement than would be expected if the work were an example of Egyptian art. The vulture head and wings are undoubtedly borrowed from Egypt, and the pose of the body and limbs is strongly suggestive of Egyptian ideas. The position of the hands seems to be repeated in nearly every example of Assyrian ornament where the figure represents a deity, and is similar to certain Egyptian productions of the kind, except that the limbs are clumsy and the molding possesses much less refinement. This is characteristic of all Assyrian sculpture. Brutal strength seems to have been of more importance in many cases than graceful proportions. The details of every part, however, were finely wrought and no item of the ornamental scheme seemed to have been considered of lesser importance than another. As said before, the pineapple seems to be the only new vegetable type introduced into their decorative schemes. It is apparent as the fruit on the sacred tree, Fig. 32, and is also seen in the right hand of the deity Asshur in Fig. 35. Its particular significance is not known, and although it may have played as important a part in the Assyrian devotion as the lotus did in the Egyptian, it was not developed in the designs of other countries as were the devices based on the lotus blossom. The Assyrian style finds no place in modern architectural applications.

GREEK ARCHITECTURE

(500 B. C. TO 150 B. C.)

INFLUENCES

55. Geographical.—The map of Greece shown in Fig. 36 presents a small country projecting into the Mediterranean Sea, which washes its shores on three sides. There are numerous islands scattered about its coast, and many natural harbors that the natives found convenient for the development of trade and commerce. The country itself was active on account of the population concentrated along its seacoast, but the mountainous character of the interior prevented any overland means of communication until Greece came into the possession of the Romans.

56. Geological.—The principal geological product of Greece was white marble, to which we owe much for the magnificent development of our artistic taste. White marble is the best material known for monumental buildings, and was found in great abundance in certain localities. In other parts of Greece, buildings were constructed of bricks. These were occasionally coated with a cement composed of marble dust and lime and would take as high a polish as the marble itself.

57. Climatic.—The climate of Greece varied from extreme tropical heat in summer to the severest cold in winter; therefore, her architects had to provide against the inclemency of these seasons. The civilization of the country was unique, situated as it was between the rigorous surroundings of Northern Europe and the passive conditions of the Orient, or Southern Asia, and the Greeks therefore worked out their architectural problems with the energy of the one and the deliberation of the other that was sure to attain the highest degree of perfection.

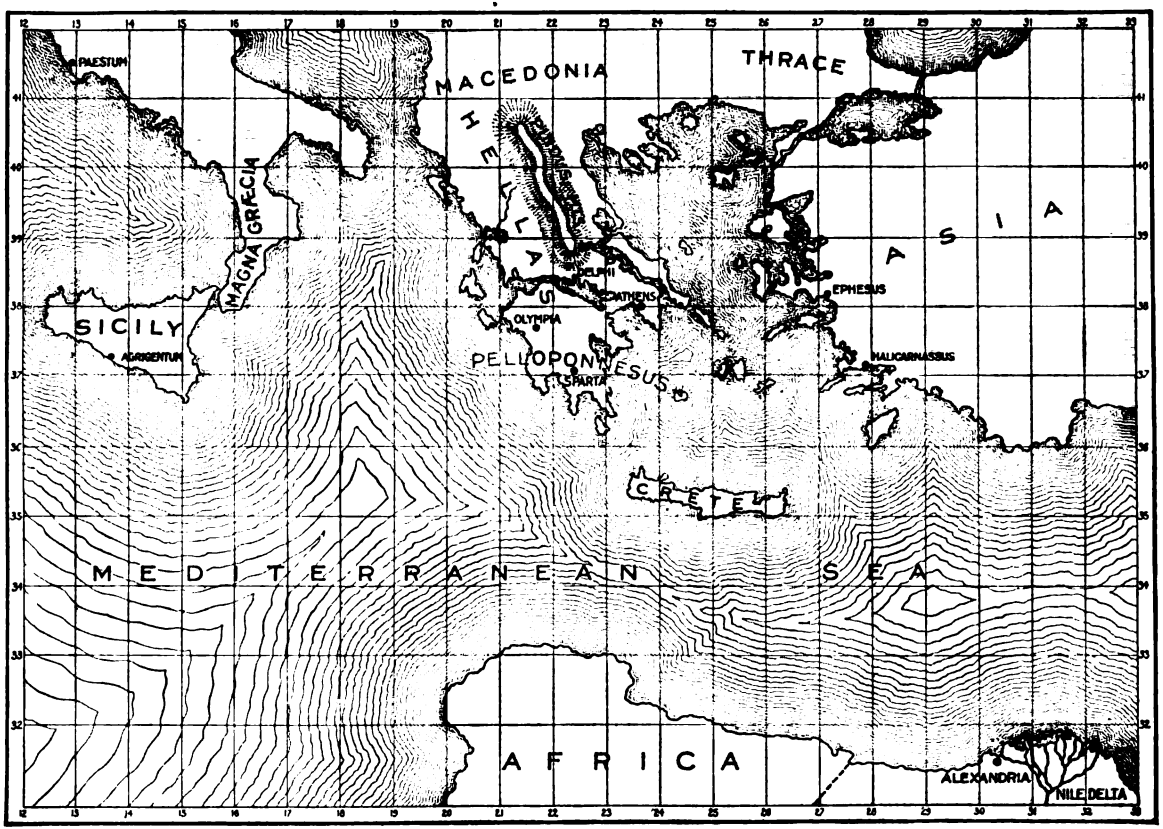

PAESTUM
MAGNA GRAECIA
SICILY
AGRIGENTUM
MACEDONIA
THRACE
HELLAS
DELPHI
ATHENS
OLYMPIA
SPARTA
PELLOPONNESUS
EPHESUS
HALICARNASSUS
ASIA
CRETE
MEDITERRANEAN SEA
AFRICA
ALEXANDRIA
NILE DELTA

FIG. 36

58. Religious.—The Greek religion was not a direct worship of idols, but of the phenomena of nature, of which the gods were personifications. Owing to the isolation of the different communities, each had its own festivals and ceremonies. The priests, generally speaking, were of little importance, and served for a brief period only. Both men and women officiated at the altars, and the temples themselves contrast with the Egyptian temple, particularly in the fact that a single, small, well-illumined cella in the center replaces the dark, mysterious halls of the superstitious Egyptians.

59. Political and Historical.—The Greeks, owing to their geographical surroundings, were naturally colonists, and migrated to the coast of Asia and across the Mediterranean. This emigration was established by the Greek government as early as 700 B. C., both to reduce the crowded population and to encourage trade. The colonies were therefore frequently occupied by a people much more enterprising and energetic than those of the mother country. For this reason we find some of the most important buildings in Asia Minor and on the islands. It is not remarkable, either, to find in these Asiatic edifices an influence of Orientalism. The people themselves, as a whole, were fond of national games and religious festivals, and thus became united in reverence for their government and their gods. They loved music, drama, and games in physical culture, and liberally patronized the fine arts. They lived an outdoor, open-air life, and public ceremonies and courts of justice were frequently conducted in the public squares.

60. The early Greeks, called Pelasgi, were a warlike race and contributed much to their descendants in the islands. They were conquered by a neighboring tribe, who in turn were defeated by some tribes from the north, called Dorians. The Dorians afterwards established themselves at Sparta. Later, the Persians overcame the Greeks in Asia Minor and made them subjects of the Persian Empire. These Greek subjects revolted, however, and war between Persia and

Greece resulted in victory for the Greeks at the battle of Marathon, in 490 B. C. Ten years later a second Persian invasion under Xerxes ended in the naval victory of Salamis, in 480 B. C. The great national exultation caused by these two victories over the Persians is largely responsible for the fact that most of the important temples were built within the 50 years following this period. Under Pericles, from 444 to 429 B. C., Athens reached the zenith of her prosperity in artistic development. The rapid growth of Athens excited the jealousy of the neighboring city of Sparta, and brought on another war, known as the Peloponnesian war, which lasted from 431 to 404 B. C. At the close of this war, Greece was weakened internally and the ascendency of Athens was destroyed forever. Greece became a Roman Province in 146 B. C.

FIG. 37

61. The few architectural monuments now standing, from which we can judge of the art and skill of the early Pelasgi, consist of massive walls, built of huge pieces of roughly hewn stone laid up together without mortar, as shown in Fig. 37. The immense proportions of these stone blocks suggest that the method of their quarrying was derived from Egypt, while the shape of the openings in the walls, produced by corbeling each successive block slightly beyond the next one below, was probably derived from some of the structures observed in Asia.

The Greek historians looked on such achievements in construction as something beyond the power of ordinary men, and declared these walls to have been built by the Cyclops, a mythical tribe of giants; and to work of this character the Greek legends ascribe the name of *Cyclopean masonry*. This system is somewhat more clearly shown in their tombs, the

most important of which is the Treasury of Atreus, Fig. 38, built at Mycenæ. The entrance *a* opens into a circular chamber, the side walls of which are corbeled over to make a pointed dome. These tombs were called *treasuries*, because it was customary to deposit in the vaulted chambers valuable chalices of gold, silver, or bronze, together with coins, pottery, etc. These tombs, or treasuries, are of architectural importance, however, only so far as they illustrate the system of construction, and thereby preserve the thread from a simpler system that preceded to an advanced system that followed. It should be noted that though the walls of this structure form a pointed dome, the beds of the stones of which it is built are horizontal and do not radiate from the centers from which the arcs of the sides are struck. It will be seen later that this is not a true vault in the sense that vaults were constructed by later people and therefore does not contradict the fact that Greek architecture is a purely trabeated style and never took advantage of the mechanical principle of the arch.

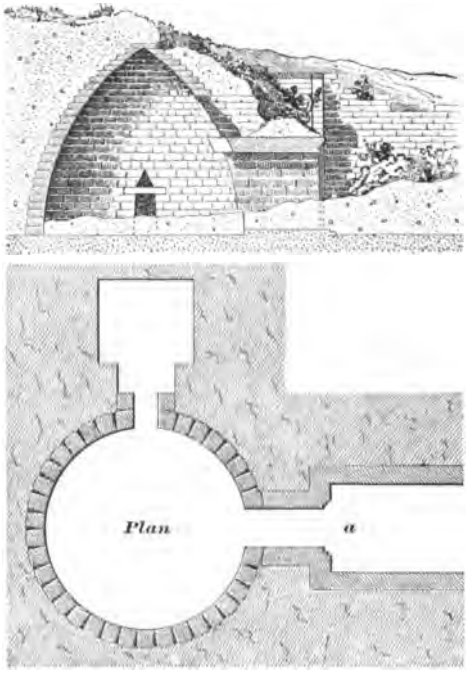


FIG. 38

62. The period which followed the Persian wars, known as the Hellenic Period, included all the principal temples and other monuments erected between the years 480 B. C. and

146 A. D., when Greece became a Roman province. The first fifty years of this period, known as the age of Pericles, was one of the most intellectual eras in the history of the world.

The architecture of the Egyptians, Assyrians, and Persians exercised very little influence on the art of the Western nations, while the influence of the Periclean period of Grecian art, pervades all subsequent architectural history.

CHARACTERISTICS

63. Greek cities were usually built on or near a fortified hill called the *acropolis*, or "upper city," and on this acropolis are usually found the principal temples and treasuries. The arrangement of the buildings on the acropolis at Athens is shown in Fig. 39. Other Greek cities of importance were Olympia, Sparta, and Delhi, in Greece proper; Pæstum, in Southern Italy; Agrigentum, in Sicily; and Ephesus and Halicarnassus in Asia Minor.

64. Greek architecture reached its full development in temples, and though we can still study the remains of theaters, circuses, market places, and tombs, it is in the Grecian temple that we find the perfection of detail that has made Greek art immortal.

The earliest temples consisted of a *naos*, or single cell, only, and were *astylar*, that is, without columns, except sometimes on the front, where a *pronaos*, or porch, was produced by continuing the side walls beyond the front wall of the naos, and placing the columns in *antis;* that is, between the two pilasters forming the ends of the projecting walls, as shown in Fig. 40 (*a*). This figure illustrates the plan of the temple, showing the naos, or sanctuary, at *a*; the pronaos, or advanced porch, at *b*; and the two columns, *in antis*, between them at *d*.

65. The arrangement of all later Greek temples was extremely simple. A platform *a*, Fig. 40 (*f*), surrounds the building on which the columns stand. The pronaos, or porch, *b*, is immediately in front of the entrance to the naos,

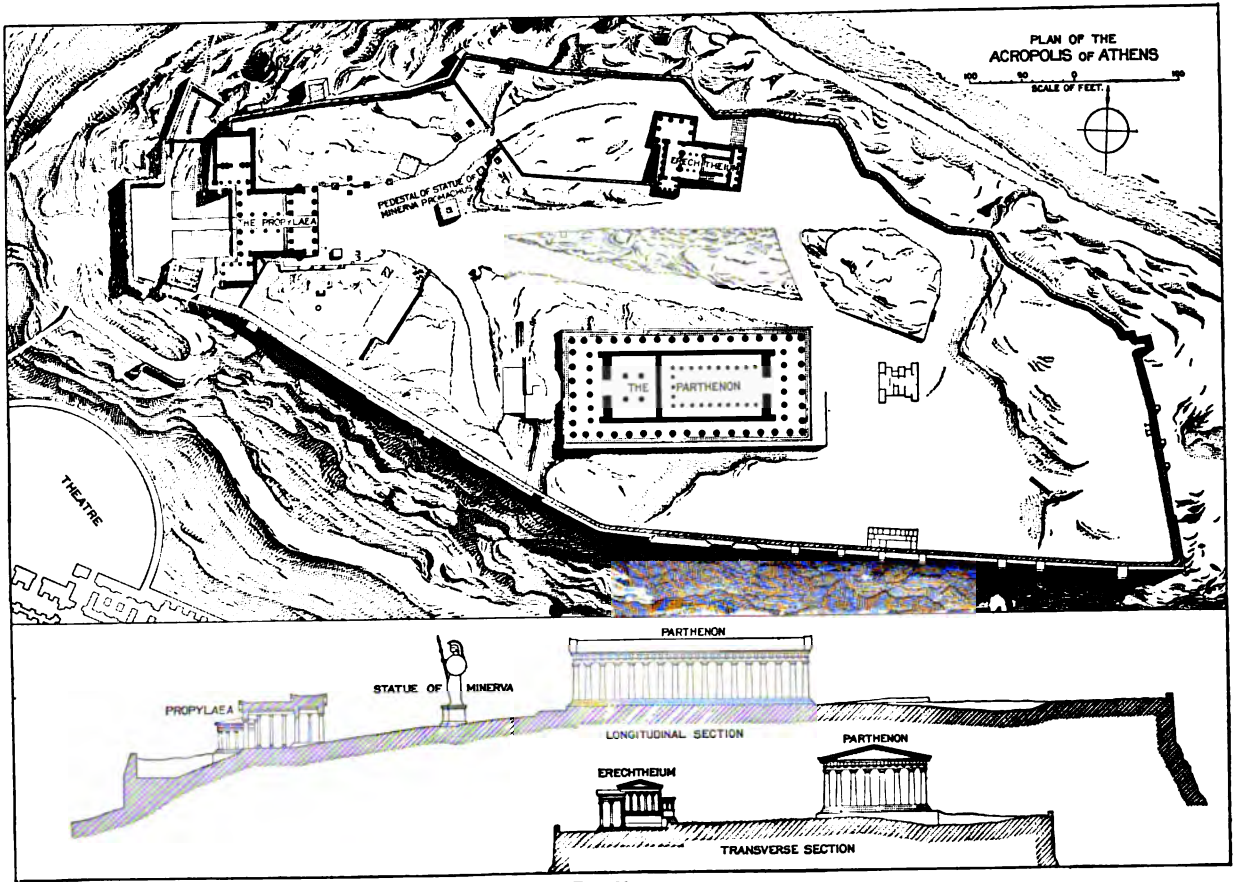

PLAN OF THE
ACROPOLIS OF ATHENS
100 50 0 150
SCALE OF FEET.
THE PROPYLAEA
PEDESTAL OF STATUE OF MINERVA PROMACHUS
ERECHTHEUM
THE PARTHENON
THEATRE
PARTHENON
STATUE OF MINERVA
PROPYLAEA
LONGITUDINAL SECTION
PARTHENON
ERECHTHEIUM
TRANSVERSE SECTION

FIG. 39

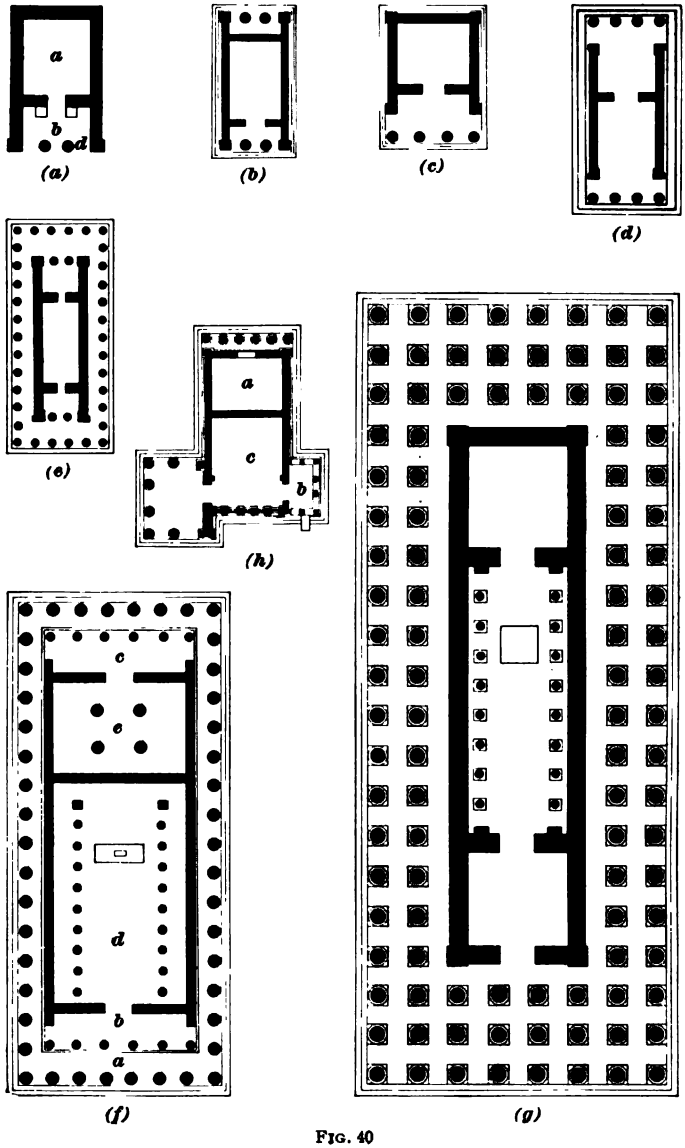


FIG. 40

or cell, *d*. At *e* is the *opisthodomus*, or treasury chamber, where the gold and silver chalices, urns, torches, and braziers, employed in various ceremonies, were stored when not in use, and at *c* is the rear porch, or *posticum*.

66. On the exterior of the temples, variety was attained by arranging the columns in one of seven distinct systems:

1. Distyle (two columns) in antis, as in Fig. 40 (*a*).
2. Distyle in antis at both ends, as in Fig. 40 (*b*).
3. Prostyle tetrastyle, that is, four columns with front portico, as in Fig. 40 (*c*).
4. Amphi prostyle tetrastyle, four columns and porticos, at each end, as in Fig. 40 (*d*).
5. Peripteral hexastyle, surrounded by columns, six on each end, as in Fig. 40 (*e*).
6. Peripteral octastyle, surrounded by columns, eight on each end, as in Fig. 40 (*f*).
7. Dipteral hexastyle, or octastyle, surrounded by two rows of columns, with six or eight at each end, as in Fig. 40 (*g*).

Circular and octagonal temples also existed, but these are rare and can be considered as exceptions to the general rule.

67. All of these temples were erected in one of three systems of architectural design, each consisting of a substructure, a column, a beam or lintel, and a superstructure. These four details are varied somewhat in different structures, but were arranged in three systems, the details of which remained almost constant in all structures where each was followed. These systems are called **architectural orders,** and are classified as the *Doric order*, the *Ionic order*, and the *Corinthian order*, being named after the section of the country where each system is supposed to have originated. In Fig. 41 are shown these three orders according to the Greek standard, the Doric being shown at (*a*), the Ionic at (*b*), and the Corinthian at (*c*). The relative proportions of the height of the column to its diameter, can be judged in each order, as the columns in Fig. 41 are all of the same thickness at the base.

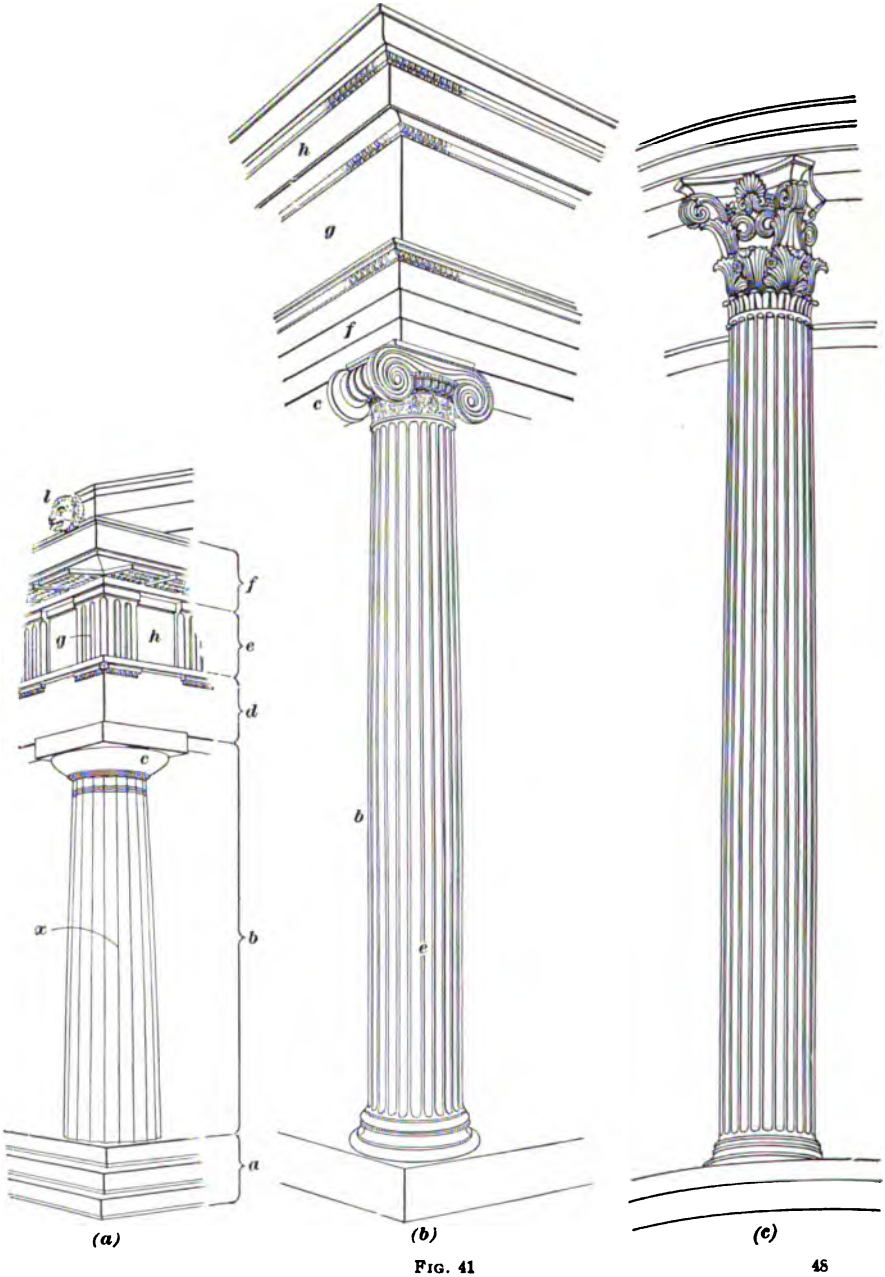


FIG. 41

EXAMPLES

68. The Parthenon.—The Parthenon was a temple dedicated to Athena Parthenos (Athena the Virgin). Ictinus and Calliciates were the architects, and Phidias the superintending sculptor. The plan of this temple, Fig. 40 (*f*), shows it to be peripteral octastyle, with seventeen columns on the sides. It stood on a stylobate of three steps, the top step being 102 ft. × 228 ft.—a proportion of about 4 to 9. Each step is

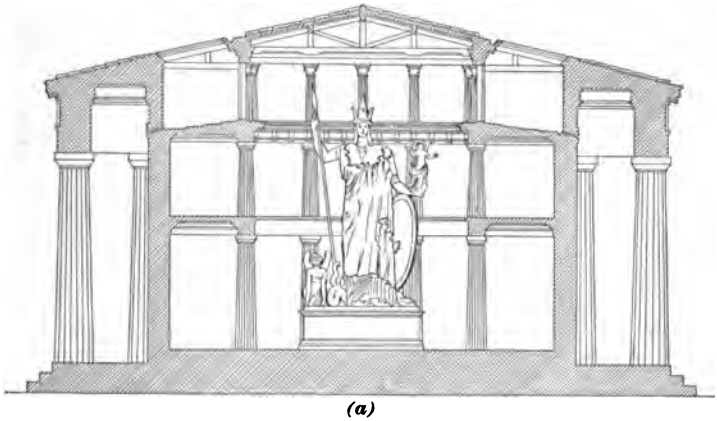
FIG. 42

1 ft. 8 in. high × 2 ft. 4 in. wide, and intermediate steps of half these dimensions are provided at the entrances.

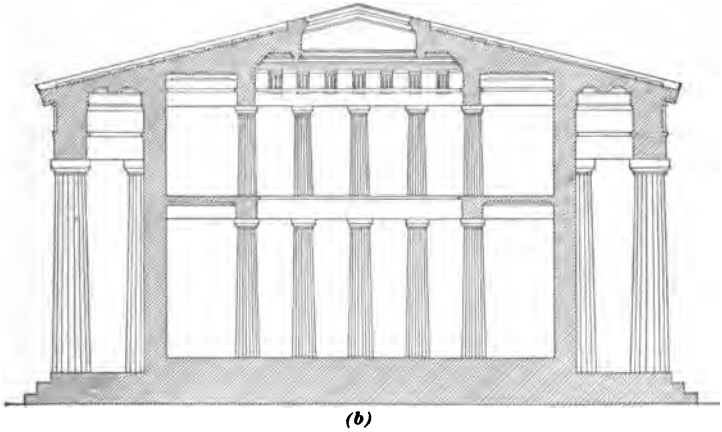
The Doric was the order especially loved by the Greeks, and as used in the Parthenon is as complete and as perfect an architectural feature as has ever been known. Fig. 42 shows the condition of the structure as it stands today in ruins on the Acropolis at Athens, while in Fig. 43 is shown a view of the Parthenon, made from a restored model of the temple, in the Metropolitan Museum, New York. This model shows the building as completed by the architects in the year 438 B. C.

Fig. 43

69. Owing to the ruined condition of this celebrated structure, there have been several theories advanced as to how the interior was lighted. The architectural historian Ferguson maintains that this was effected by means of a clearstory, as shown in the sectional view, Fig. 44 (*a*), while



(*a*)



(*b*)

FIG. 44

Bötticher, another historian, advanced the theory of a central opening along the ridge, as shown at (*b*). Both agree upon an upper tier of interior columns, although this construction was never used on the exterior of any Greek temple.

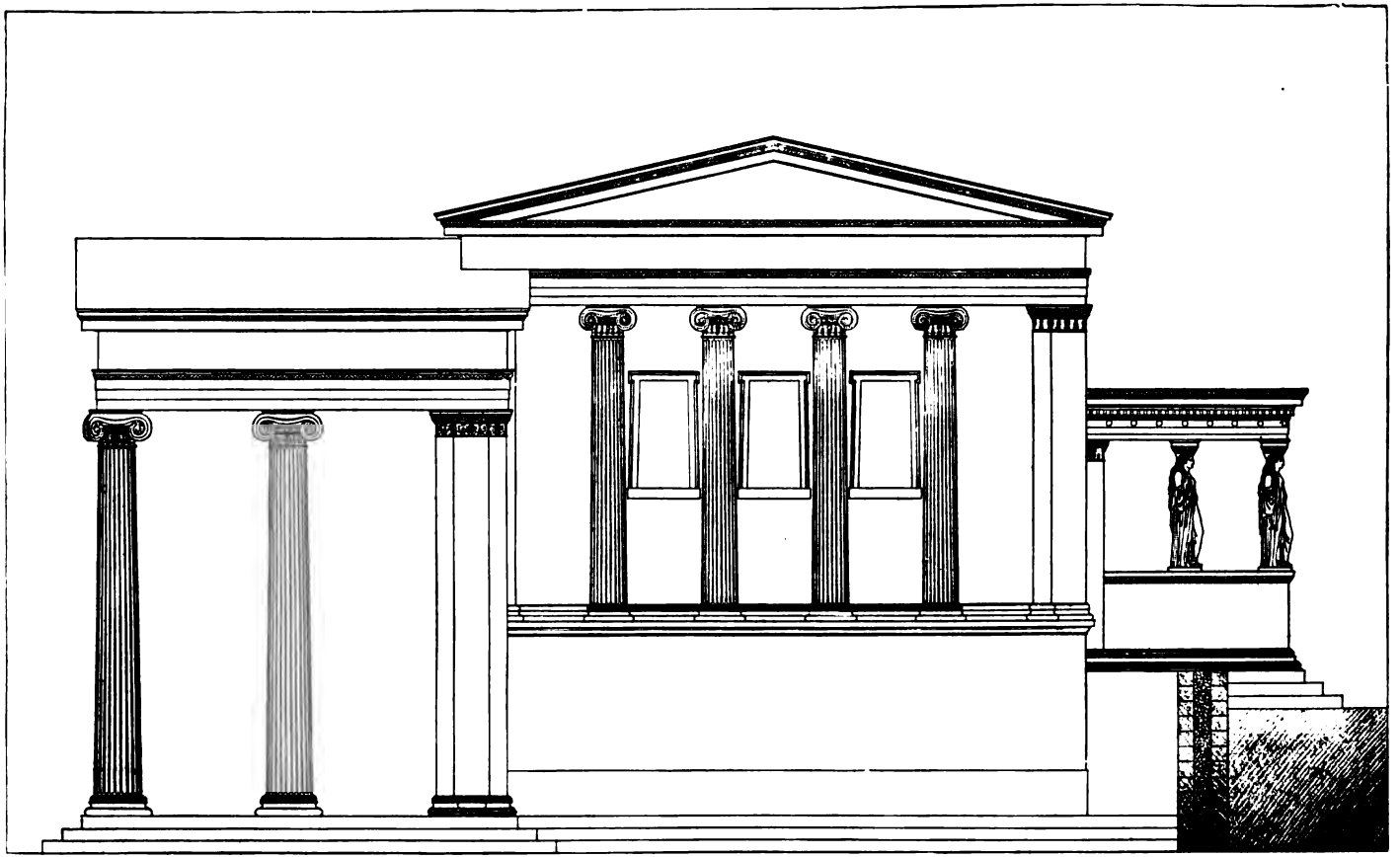


Fig. 45

Within the temple was a marvelous statue of Athena sculptured by Phidias. This statue was 40 feet in height and was composed of gold and ivory. It represented Athena in full armor, with helmet, spear, and shield, in her character as defender of the nation. The face, hands, and feet were of ivory, but the drapery and the armor were of solid gold with precious stones inserted.

70. The Erechtheum.—The principal Greek structure in the Ionic order was the Erechtheum, and consisted of a

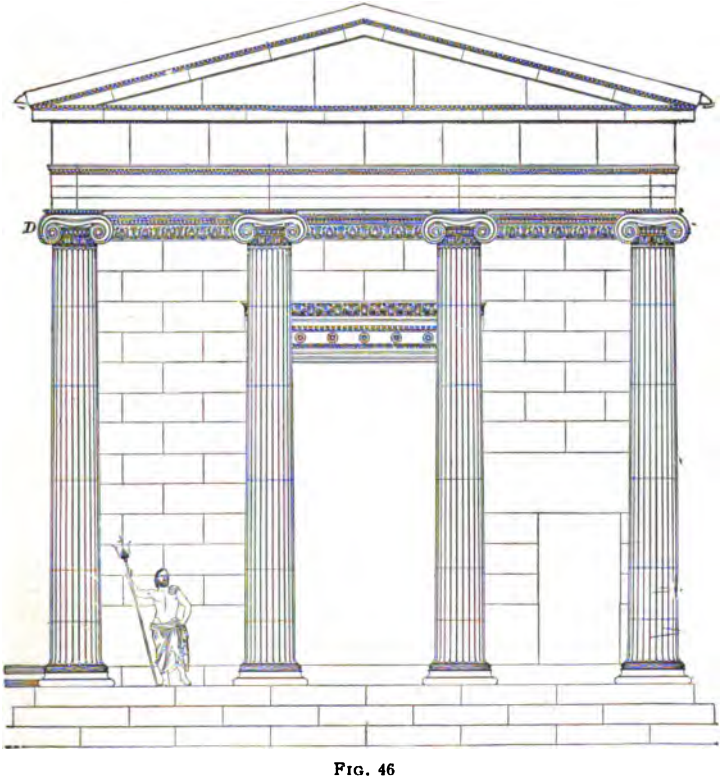


FIG. 46

triple temple, as shown in the plan, Fig. 40 (*h*), which exhibits the peculiarities of its outline. It combined three temples, that of the Greek god Erechtheus at *a*, and those of

the goddesses Pandrosus and Athena Polias at *b* and *c*, respectively. The design was intentionally unsymmetrical, not only in plan but in elevation, as shown in Fig. 45—as the three temples were on different levels—and was varied as widely in detail as circumstances would permit. The porch of the temple of Athena Polias on the north side was on the lowest level and contained six columns, four in front, as shown in Fig. 46. The temple of Erechtheus on the east side contained six columns in its porch, but they were all arranged across the front, with no extra ones at the sides.

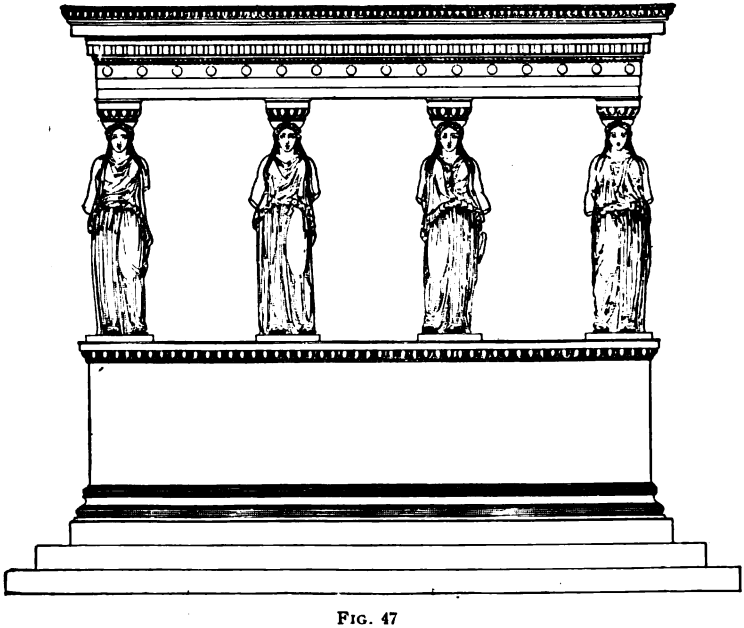


FIG. 47

In the temple of Pandrosus, the roof is not supported on columns at all, but on the heads of sculptured female figures called *caryatids*. A front elevation of this last temple is shown in Fig. 47, and a detail of one of the caryatids, in Fig. 48. As will be observed, the Grecian architect exerted every effort in his power to prevent this building from presenting the appearance of a single temple dedicated to only one god.

71. The caryatid figures, Fig. 48, in the porch of the Erectheum are unique, as there is only this one example of their use for such a purpose. The entablature they support is Ionic in detail, but the height of the figures is much less than the corresponding column would be. The figures are heavily proportioned to fulfil the demand for an appearance of strength, and the draperies are exquisitely modeled, as are all details of Greek sculpture.

FIG. 48

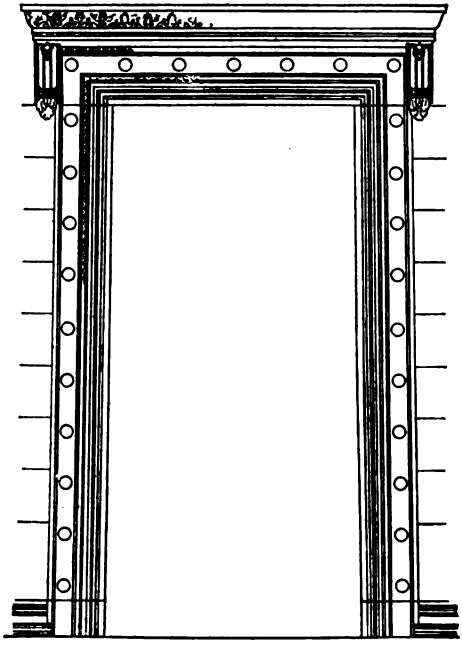


FIG. 49

72. The doorway of the temple of Athena Polias, of which the cornice only is visible in Fig. 46, is shown more in detail in Fig. 49. It is of interest because there are so few examples existing where the details of the openings can be studied. This door is a trifle more than twice as high as it

is wide, and the sides taper slightly so that the top is only about fifteen-sixteenths the width of the bottom. This diminution was undoubtedly given in order to obviate any appearance of weakness. The conventional honeysuckle ornament adorns the cyma and an egg-and-dart ornament is carved on the ovolo under the soffit of the corona (see Art. **91**). The projection of the cornice is about equal to its height, and the soffit at each end is supported by a scroll form of bracket, called a *console*.

The windows, as shown in Fig. 45, possess the same relative proportion as the doorway.

FIG. 50

73. Temple of Nike Apteros.—Another Ionic structure that was demolished and its stones built into the Acropolis walls, is the little temple of Nike Apteros, or Wingless Victory, Fig. 50. This little edifice was rescued by architectural students, however, and rebuilt in its original position on the right of the Propylæa stairs, as shown at *d*, Fig. 51. Fig. 50 shows the front elevation of the temple of Wingless Victory as it existed after the restoration. The frieze is observed to be carved with various human figures, a condition that is unusual in the Grecian-Ionic buildings.

74. The Propylæa.—Another important Doric structure is the Propylæa, or principal gateway to the Acropolis, which is shown in Fig. 51. The Acropolis of Athens was a fortified hill surrounded by a wall in which were nine gateways. The Propylæa *a* consisted of a Doric hexaprostyle portico, the central columns of which were separated more than the others in order to form a wider passageway for the religious processions. Beyond this is a vestibule divided into three

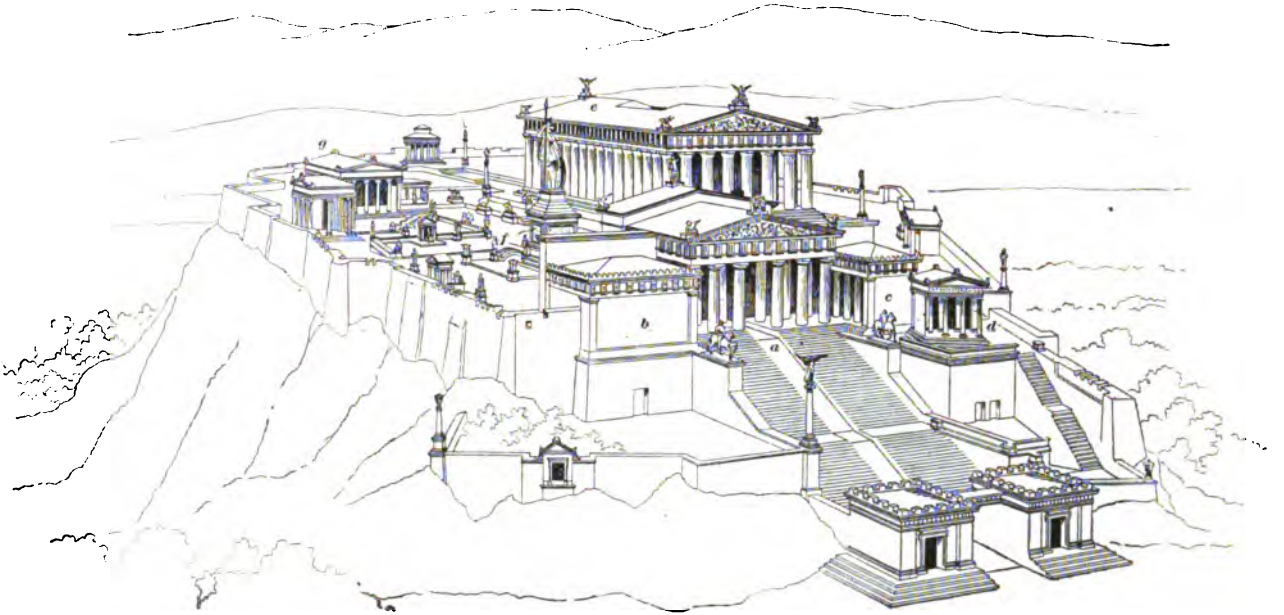


Fig. 51

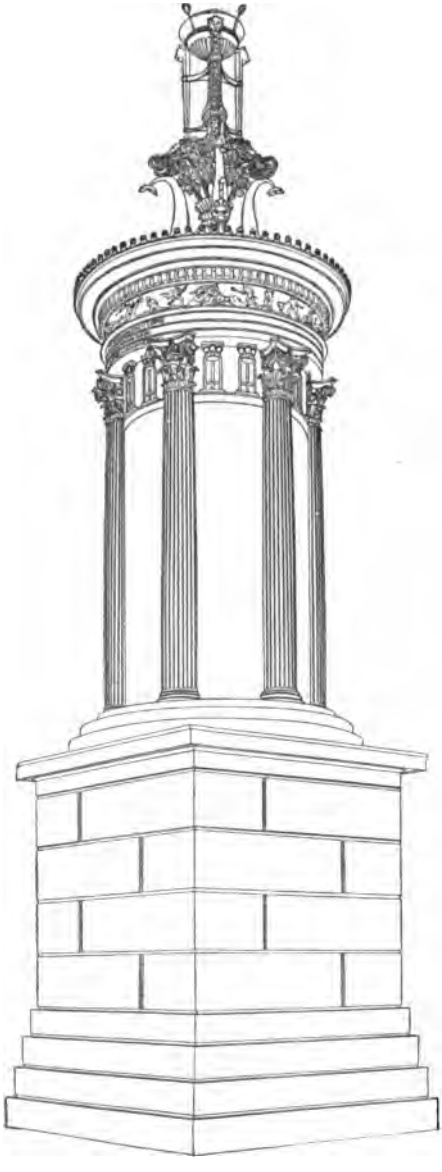


FIG. 52

parts by two rows of Ionic columns, each row of which forms the front of a small *tristyle*, or three-columned temple *in antis*, to the right and left of the vestibule, as shown at *b* and *c*.

Beyond the Propylæa, the summit of the hill was leveled off to form a plateau, and prominent on the south side at *e* stood the celebrated Parthenon. A colossal statue of Athena *f*, stood directly in front of the center of the Propylæa, and to the left of this monument and northeast of the Parthenon stood the Erechtheum, the triple Ionic temple, as shown at *g*. Smaller temples to minor deities and statues of heroes and gods were numerous along the walls of the Acropolis, and the entire plateau was laid out to make a most impressive architectural composition, worthy of the gods to whom incense was burned on the numerous altars. See also Fig. 39.

75. Choragic Monument of Lysicrates.—There is only one perfect example of the Corinthian order found in Greece at the present day, and this is the little structure known as the Choragic Monument of Lysicrates, which is shown in Fig. 52. This structure stands on a square pedestal built to receive it, and is surmounted by a bronze tripod; but these details form no part of the order itself. The stylobate in this example is circular in plan, and the columns are arranged around and against a cylinder; but these and the superstructure will be considered as though they were entirely detached, as in the previous examples. The shaft of the column is grooved by twenty-four flutes separated by fillets, as in the Ionic order, but is longer in proportion to its diameter. It also has a molded base similar to the Ionic, but this is spread more on account of the smaller sectional area of the column. The capital is taller than that of either of the other orders, and is carved in representation of foliage arranged around a bell-shaped core. The entablature is similar to that division of the Ionic order, but is much richer in moldings and carvings.

The foliage of the capital and the ornament supporting the bronze tripod above is based upon the *acanthus*—a plant growing freely in Mediterranean countries, that strongly resembles our modern thistle. The acanthus is another of those vegetable types that like the lotus became almost emblematic in itself of a particular architectural style. The Greeks used it in their decorative schemes and carried it around the bell of the capital of their Corinthian columns, thus introducing a new architectural detail—the foliated capital. The Egyptians carved and painted their capitals in conventional representation of the lotus blossom and papyrus plant, as has been shown in Fig. 14, but the Greeks went a step further, and, adopting the bell shape for the core of the capital, they embellished it with delicately arranged foliage from the acanthus plant. The Corinthian order, however, was never used by the Greeks in their temple architecture. It was used in small buildings only, and of these but few examples exist.

76. Tower of the Winds.—Another structure at Athens, the Tower of the Winds, Fig. 53, possesses a foliated capital, on its columns, but the columns have no base. The building was octagonal in plan, and on each side was carved a figure emblematic of the wind from that particular direction.

The building contained a clock operated by water-power and it was in reality more a building of public utility than

FIG. 53

an architectural monument, to be classed with the great temples of Greece. On two sides it presented projecting porches, whose roofs were closed on the outer ends with pediments supported on baseless columns. The whole trend of these Corinthian designs is directly against the architectural traditions of Greece. Neither of them is a temple, and neither of them presents a single architectural detail that can be found in the temple orders.

77. Tombs.—The tombs in Greece proper are of no great account architecturally, but in the Greek colonies there are several of great importance. The colossal Mausoleum at Halicarnassus, Fig. 54, erected to Mausolus, King of Caria, was an immense Ionic structure, 140 feet high and

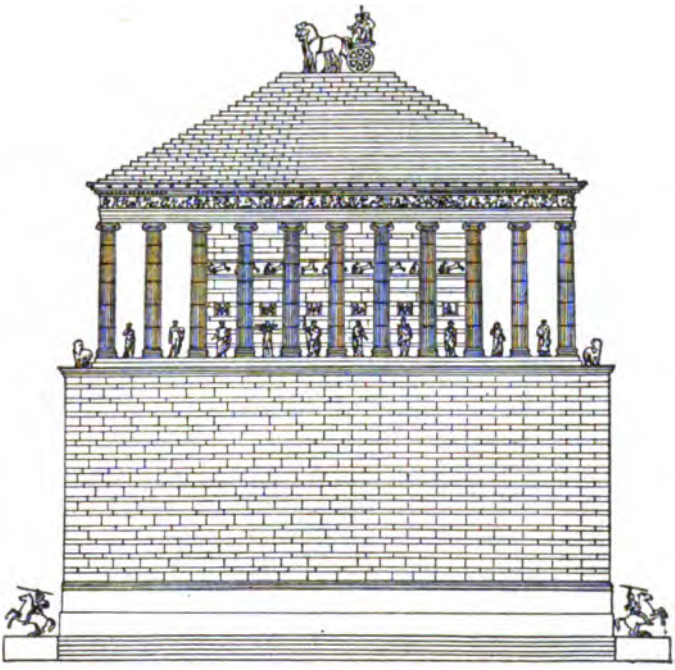


FIG. 54

115 feet square at the base. The richness of its sculpture and the beauty of its proportions made it an object of great admiration among the Greeks, by whom it was classed as one of the seven wonders of the world.

78. Theaters.—Greek theaters were interesting structures, but were entirely different from the same class of building at the present day. They were cut out of the rock on a side hill, and arranged in the form of a semicircle, with seats in rows parallel with the circumference, as shown in

Fig. 55. The stage was built across the center, back of which the scene was set, and the whole enclosure was covered with an awning, called the *velarium*, arranged to protect the spectators from the sun. The velarium was stretched from

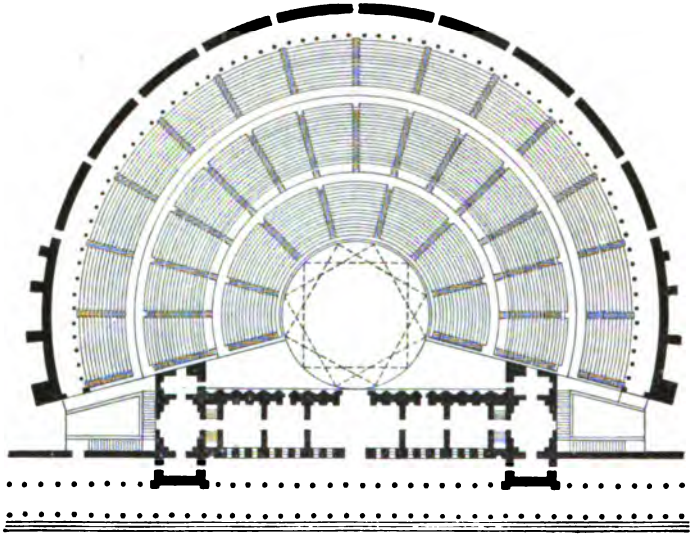


FIG. 55

the top of a row of columns, which were the only architectural feature visible from the outside of the building.

79. To the Greeks we owe the greater part of the beautiful and delicate details of columnar architecture. To them we are indebted for the most refined methods of obviating the defects of optical illusion. The apparent depression in the cornice across the front of the temples, caused by the mass of material and apparent weight in the center of the pediment, was obviated by curving the cornice so that the center was highest. The steps were curved in the same upward way. The architrave and frieze of the Parthenon sloped about 1 part in 80 toward the center; and so it was in all the minute details of construction. The Greeks not only avoided structural weakness in design, but invented methods to overcome even the slightest appearance of such weakness.

ANALYTICAL STUDY

PLANS

80. Greek temples were almost invariably rectangular in plan and symmetrical in design. The exceptions being the Erechtheum, Fig. 45, and the Propylæa, Fig. 51, which were irregular; the Choragic Monument of Lysicrates, Fig. 52, which was round; the Tower of the Winds, which was octagonal, and a few others. Contrasted with the Egyptian temples, the columns of the Greek temples are found to be entirely on the exterior and uniform in style and design in each temple.

WALLS

81. The walls were built of solid stone cut with mathematical exactness. No mortar was used, the joints being so placed as to remain tight through the force of gravitation. The finish was obtained by rubbing the surface of the finished wall with fine sand.

ROOFS

82. The roofs of the Greek temples were usually of tile laid on timber beams and extending only over a portion of the building, so as to form a central light well, as in Fig. 44 (*b*), or a clearstory, as in Fig. 44 (*a*). However, since all of these timber beams have rotted away during the intervening centuries, much controversy exists on this point owing to lack of satisfactory evidence.

COLUMNS

83. The temples being only one story high, the column and its entablature constituted the entire height of the building. These temples were in one of the three orders, except in the Propylæa, where the Ionic order was introduced in an otherwise Doric composition. In the Erechtheum, the

caryatids were used on the porch, but as this was an exceptional structure, the caryatids can be considered as an element of this exception.

84. The height of the **Grecian Doric column** is from four to six times its diameter, and it stands, without any intermediate base, immediately on the stylobate, or substructure, *a*, shown in Fig. 41 (*a*). The column is divided into two parts, the shaft and the capital, the shaft being the straight portion shown at *b*, while the capital is the cushion-shaped block *c* interposed between the shaft and the entablature, or superstructure, to receive the superimposed weight and concentrate it at the top of the column. The diameter of the shaft is less at the top than at the bottom, the diminution being effected, not in a straight line from the bottom to the top, but in a curved line that renders the face of the column slightly convex or barrel-shaped. This curved profile is called the *entasis* of the column, and its purpose is to overcome an optical illusion, which causes long, straight lines to appear hollow or concave. This curvature of outline was maintained not only in the columns, but also throughout entire buildings, and as a consequence, in Greek compositions, there is not a straight line in the entire structure. The shaft is grooved by from sixteen to twenty flutes that meet on the surface and form ridges or *arrises*, as shown at *x*.

85. The *entablature* is subdivided into three parts: the *architrave*, or lintel, *d*; the *frieze e*; and the *cornice*, or crowning member, *f*. The frieze is broken by the *triglyphs g* and the *metopes h*. The triglyphs derive their name from the grooves, or channels, cut in their faces, two being cut in the middle and half a channel being cut on each side, making in all three channels, or "glyphs," which is the meaning of the term triglyph.

The *cornice* consists of the finish along the edge of the slabs, or tiles, that form the roof covering. It formed a gutter that discharged the rainwater through numerous curved *gargoyles*, or spouts, as shown at *l*, Fig. 41 (*a*).

86. To the Greeks we are indebted for the invention of a new architectural form, the *pediment*. This exists at the ends of the temples, and is formed by the triangle under the roof slopes, Fig. 46. The upper molding of the cornice was carried across the ends of the building from each side on a line with the roof slope, while the lower member was carried straight across the ends of the building. The triangle then forms a pediment, while the surface enclosed by the moldings is called the *tympanum*. This surface was frequently decorated with sculptured figures as in the Parthenon, Fig. 42, but equally often was left perfectly plain. The soffit, or under side, of the lower member of the cornice was ornamented with a number of projecting slabs, called *mutules*, representative of the ends of the rafters in the sloping roof. These slabs were placed regularly around all four sides of the building, being centered over each triglyph and metope.

87. In the **Ionic order**, shown in Fig. 41 (*b*), the column is more slender than in the Doric, being about eight or nine times its diameter in height. Instead of being divided into two parts, the Ionic column consists of three subdivisions, the base *a*, which forms an individual substructure under each column, the shaft, or column proper, *b*, and the capital *c*, while the stylobate, on which the column stands, is practically the same as the Doric order. The shaft is grooved by twenty-four flutes that are separated by narrow fillets *e*.

The capital *c* is the distinguishing characteristic of the Ionic order. Its volutes, or spirals, suggest that its design may have been influenced by Assyrian ideas [see Fig. 33 (*c*)]. The architrave *f*, unlike that detail in the Doric order, is composed of three bands, each of which projects slightly beyond the one below. The frieze *g* in this order is a plain band unbroken by triglyphs or other details. The cornice *h* is somewhat similar to the Doric in its proportions, but differs materially in its details, and the tympanum under the pediment is not ornamented with sculpture in any of the Ionic temples, the remains of which are now in existence.

88. In the **Corinthian order,** Fig. 41 (*c*), the shaft of the column is grooved by twenty-four flutes separated by fillets, as in the Ionic order, but the column is longer in proportion to its diameter. It also has a molded base that is similar to the Ionic, but this is spread more on account of the smaller sectional area of the column. The capital is taller than that of either of the other orders, and is carved in representation of foliage arranged around a bell-shaped core, Fig. 56. The entablature is similar to that division of the Ionic order, but is much richer in moldings and carved figures.

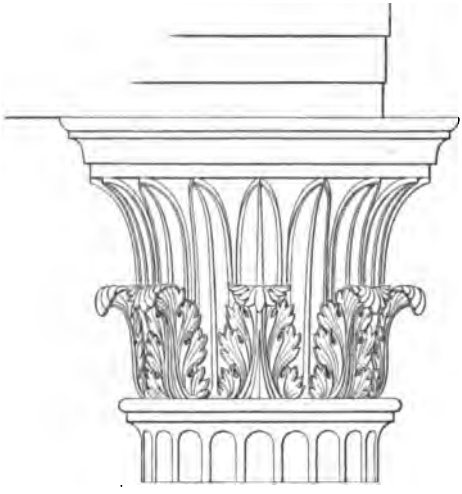


FIG. 56

OPENINGS

89. All openings in Greek structures were square-headed. The lintel alone was used to span distances between supports, as the style of architecture is a trabeated one. The openings were necessarily narrow, owing to the difficulty in obtaining stone lintels of any considerable length. The sides of the openings occasionally tapered toward the top, and they were usually relieved by an architrave at the sides and a cornice, or entablature, supported on consoles, across the top.

MOLDINGS

90. Moldings are used in architectural design to subdivide wall surfaces into smaller areas that may be treated separately. The Greeks were the first to classify their moldings systematically, and to use the combination of a few simple

forms to secure the most artistic effect. The original outlines of their moldings were probably drawn freehand, but in all cases they approximate closely to the curves of the conic sections. When they were carved or enriched, the form of decoration usually corresponded in outline to the curve of the molding itself. Thus, we find the ovolo, Fig. 57 (*g*), enriched with the "egg-and-dart" ornament, the ovolo itself having derived its name from its egg shape.

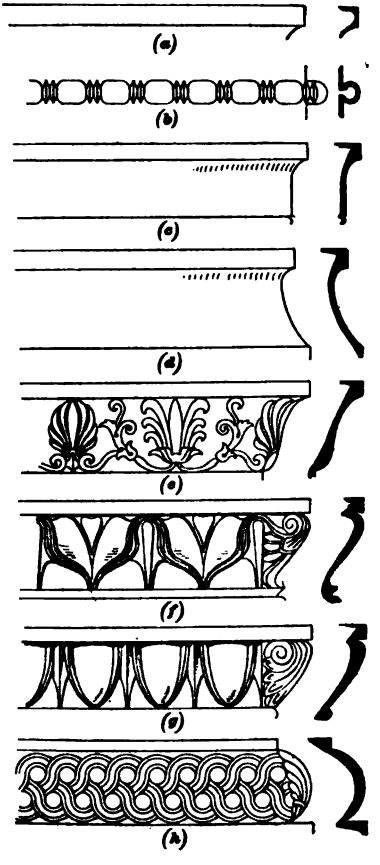


FIG. 57

91. Eight distinct moldings are found in Greek architecture, each of which is used for a particular purpose or in a distinct position. All of these moldings are used in the Ionic order, but only two of them were generally used with the Doric: the fillet (*a*) and the echinus (*f*).

1. The **fillet**, Fig. 57 (*a*), is a narrow band used to separate the members when several moldings are used in succession.

2. The **bead** (*b*) is similar to the fillet in purpose, but is round in section and frequently carved into a spindle-and-disk ornament as shown.

3. The **cavetto** is a small hollow, being almost universally used under a fillet and at the top of a plain, vertical surface, as shown at (*c*). When a hollow similar to the cavetto is used above a fillet, as at the bottom of a shaft of a column, it is called an *apophyge*, or easement.

4. The **scotia** (*d*) is a deep, hollow molding used almost exclusively in the bases of columns or other details entirely below the eye.

The two last moldings constitute all of the *hollow*, or *concave*, moldings, and in Greek architecture they were never carved or decorated in relief.

5. The **cyma recta** (*e*) is a molding of double curvature—concave above and convex beneath. Its form gives it its name, *cyma* meaning "a wave." The cyma recta was nearly always used at the top of a composition, with a fillet above and below it. It was usually decorated with the conventional honeysuckle ornament; as here shown, but in many instances was left plain.

6. The **cyma reversa** (*f*) is another molding of compound curvature, but is convex above and concave beneath. It was always used under a fillet, and when ornamented, the elements of the design were based on the profile, or curve, of the molding.

7. The **ovolo**, or **echinus**, is an egg-shaped molding (*g*) entirely convex, and its characteristic ornamentation was a carved egg-and-dart form, as shown. It is more frequently called an *egg-and-dart molding* than an ovolo.

8. The **torus** (*h*) is a large, convex molding similar to the bead, but is much larger and is used only between two fillets in the bases of columns. It was sometimes decorated with strapwork ornamentation, called a *guilloche*, as shown.

In nearly every instance, the curves of these moldings were based on the parabola, hyperbola, or ellipse, and rarely do we find the arc of a circle used. This is an important characteristic of Greek moldings.

ORNAMENT

92. Types.—The types on which Greek ornament is based are few, and the renderings are so conventional that it is difficult to recognize in many cases from what particular type the ornament was derived. The fret is used frequently, and is undoubtedly derived from an Egyptian source, as is

also much of the foliated ornament indicating a modified rendering of the conventional lotus.

93. The acanthus leaf is the first new type that is met in Greek ornament, and it appears on the Corinthian capitals and on much of the painted decoration. Fig. 58 (*a*) shows a form of the acanthus taken from the Tower of the Winds at Athens. This is a purely conventional form, possessing a broad, bold treatment necessary for its execution in stone, but it follows closely the principles of the growing plant as do all other developments in Greek ornament.

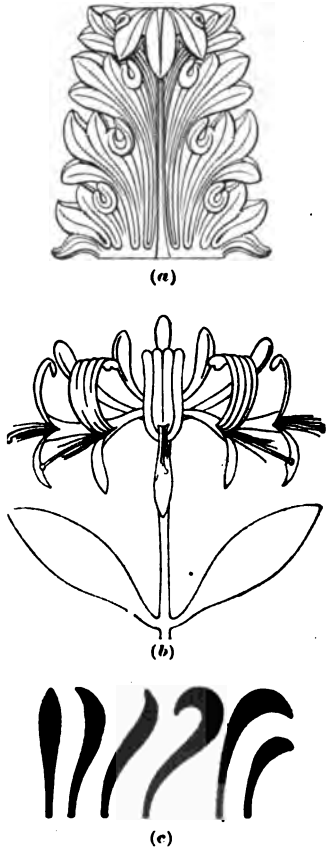
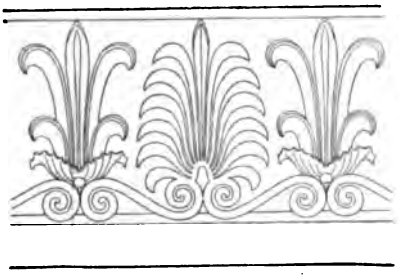
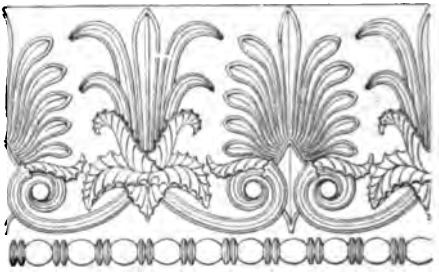


FIG. 58

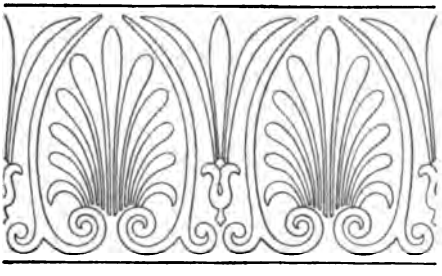
94. The Three Great Laws of Nature.—That the Greek artists carefully observed the principle on which certain plants grew, and carried that principle out conscientiously in the execution of their designs, cannot be doubted. They were close observers of nature, and although they did not copy nor attempt to imitate or make true portraits of any natural forms, they never violated a natural principle. The three great laws of nature—*radiation from the parent stem, the proportionate distribution of areas, and the tangential curvature of the lines*—are always obeyed; and it is the unerring perfection with which they are carried out in the most humble works, as well as those of the greatest importance, that fills us with astonishment at the conscientious scruples of the Greek artist.



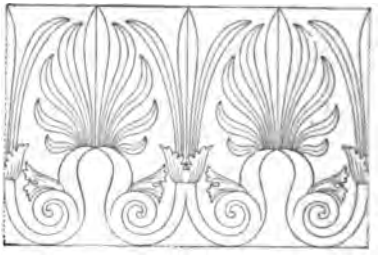
(a)



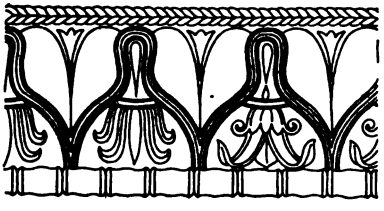
(b)



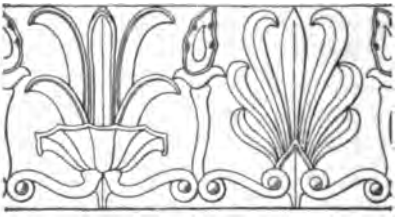
(c)



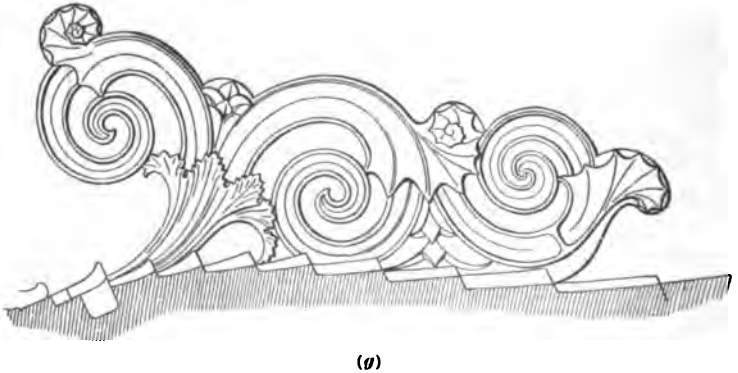
(d)



(e)



(f)



(g)

FIG. 59

95. Various Forms of Greek Ornament.—The forms shown in Fig. 59 (*a*), (*b*), (*c*), and (*d*) are usually referred to

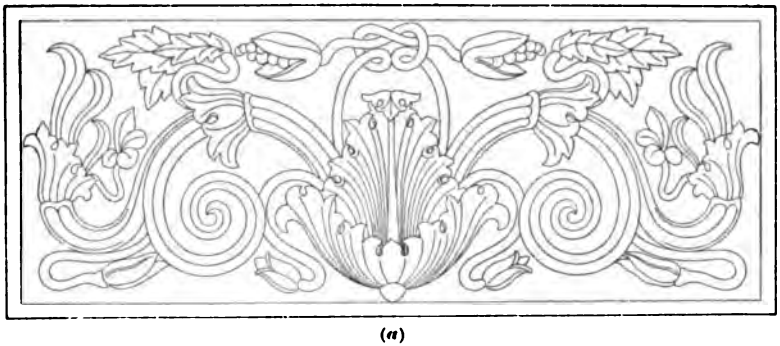
FIG. 60

as the **honeysuckle ornament,** although there is much question as to whether these forms were derived from the

conventional rendering of the honeysuckle bud, or from an adoption of certain lotus forms in single brush strokes. The natural honeysuckle blossom is shown in Fig. 60, and a strictly conventional rendering of it, in Fig. 58 (*b*). It requires some imagination to believe that the graceful strokes of the honeysuckle ornament bear any relation to the plant itself, and it is far easier to assume that these are the outcome of brush-stroke renderings of lotus forms. In Fig. 58 (*c*) are shown six strokes made with a brush and black paint. The point of the brush is first touched to the paper, and as pressure is increased, the bristles spread out and then come together again when the pressure is released, thus giving the stroke the forms shown. Variations of these six strokes constitute the principal elements of all painted Greek ornament and some carved ornament. The influence of this stroke is particularly traceable in Fig. 59 (*a*), (*b*), (*c*), and (*d*), and will be found also in subsequent examples.

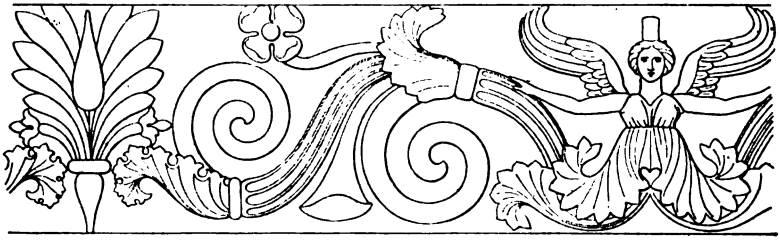
96. In order to supply *motifs* for the graceful scrolls that appear so frequently in Greek designs, the artist did not hesitate to draw inspirations from such homely growths as pumpkin and squash vines, the details of which were conventionalized into the forms shown in Fig. 61. These vine forms were sometimes combined with other forms, such as the acanthus leaf, as shown in Fig. 61 (*a*), with the honeysuckle ornament, as at (*b*) and (*d*), or the human figure, as at (*c*). Variations were practiced to suit the conditions of each case, as in Fig. 59 (*e*), where the outlines of the ornament show it to have been carved on a cyma-reversa molding. In Fig. 64 are shown four examples, introducing individual ornaments in *alternation;* that is, two forms repeated alternately in contrast to *repetition*, where one form is repeated continuously, as in Fig. 59 (*c*) and (*e*).

The scroll shown in Fig. 59 (*g*) is taken from the top of the Choragic Monument of Lysicrates and presents the characteristic principles of Greek scroll ornament. There is a main central wavy line or stem here, from which the scrolls branch off alternately from opposite sides.

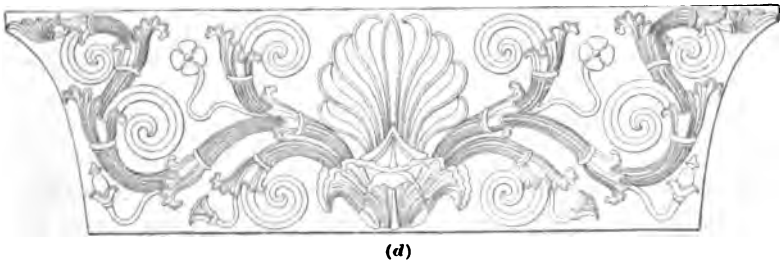


(*a*)

(*b*)



(*c*)



(*d*)

FIG. 61

The forms in Fig. 65 are known as *stellæ*, and were used largely on tops of tomb monuments. The forms at (*a*), (*b*), (*c*), and (*d*) were used on corners, and the forms (*e*), (*f*), and (*g*) as central ornaments. Although these examples

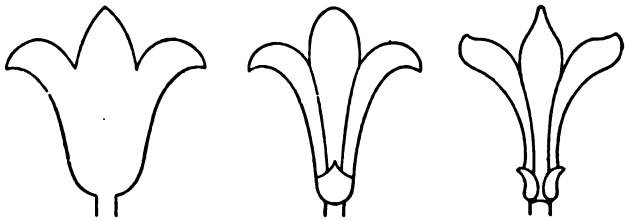


FIG. 62

were all originally executed in stone, the graceful form of the brush-stroke is evident in all of them except (*d*).

The same may be said of the **Greek lily**, Fig. 62 (*c*), which may have been derived from the lotus form (*a*) and (*b*). The **anthemion ornament**, Fig. 63, consists of the honeysuckle form enclosed in an elliptical outline. This was much used to decorate the antefixæ along the eaves, and also for the stellæ on the tops of monuments and at the points of pediments.

In Fig. 66 are shown examples of Greek ornament found on painted vases. At (*a*) is shown the honeysuckle ornament alternated with a simple form of the Greek lily; at (*b*), the anthemion designed to form a border, or stripe; at (*c*) and (*d*), rosette forms, which may have been borrowed from Egypt, as may also the wave design shown at (*g*). The fret forms at (*e*) and (*f*) are characteristic of Greek geometrical ornament. The fret is one of the most ancient forms of ornament known. It was probably derived from patterns formed by laying bricks in two colors. In the best patterns,

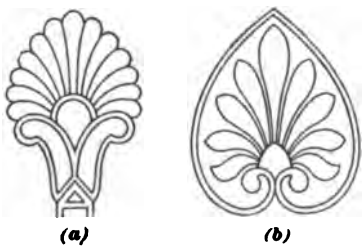
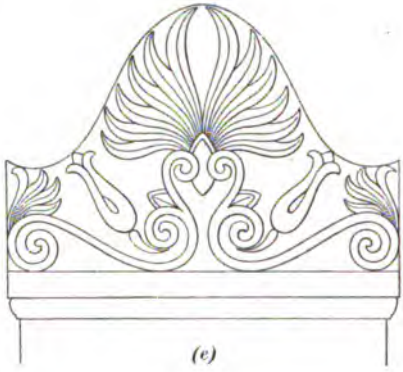


FIG. 63

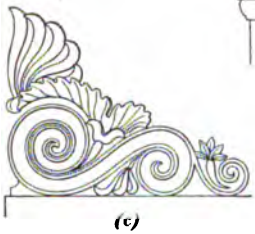
FIG. 64

(a)

(b)



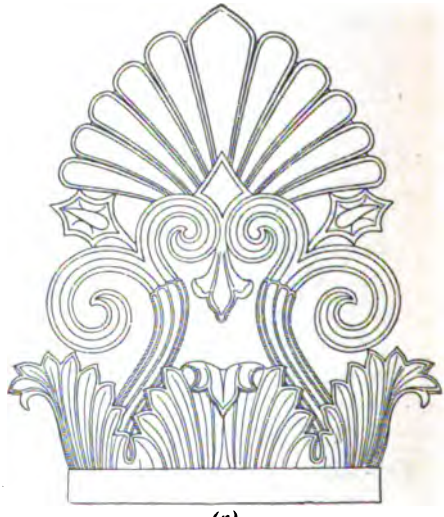
(e)



(c)

(d)

(f)



(g)

FIG. 65

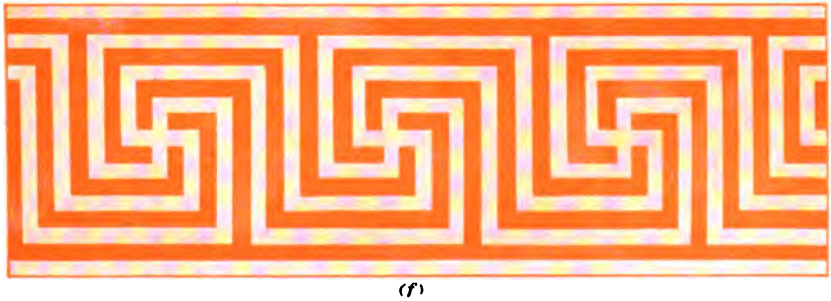
(a)

(b)

(c)

(d)

(e)



(f)

(g)

FIG. 66

161 § 50 FIG. 67

the two outlines formed by the two colors are identical and fit one within the other.

In Fig. 67 (*a*) is shown a painted stellæ; at (*b*) and (*f*) colored borders, introducing the honeysuckle ornament; and at (*c*) and (*d*), ceiling ornamentation from the Parthenon. At (*e*) is shown the carved torus molding from the Ionic order, showing colors used on that member when buildings were painted.

97. The introduction of animals and human figures in ornament was very common in late Greek ornament, and

FIG. 68

even some of the foliations terminated in the human form, as shown in Fig. 68. These forms were introduced solely for decorative effect, and should not be confused with the forms that were carved on the metopes in the Doric order, or on the frieze in the Corinthian order. The latter forms were used not only for decorative effect, but also to state a historical fact, much in the same manner as the hieroglyphs were used in Egypt.

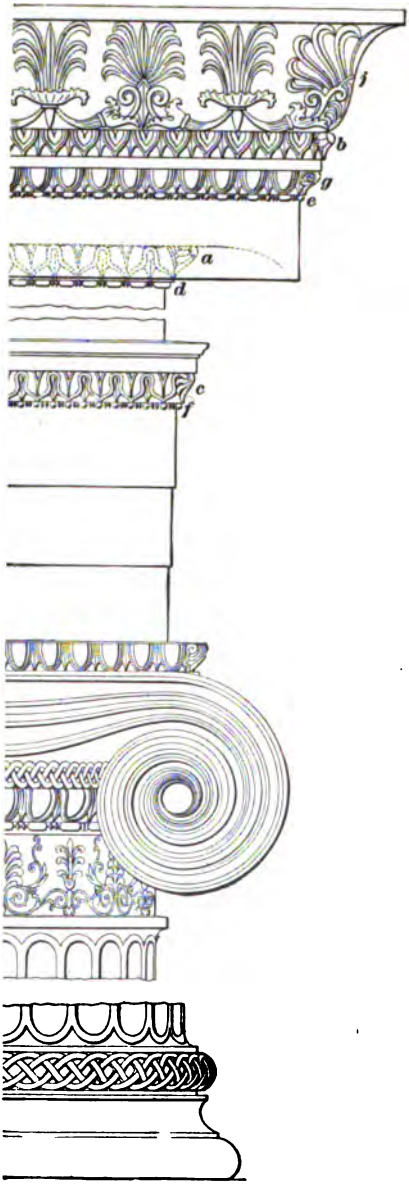
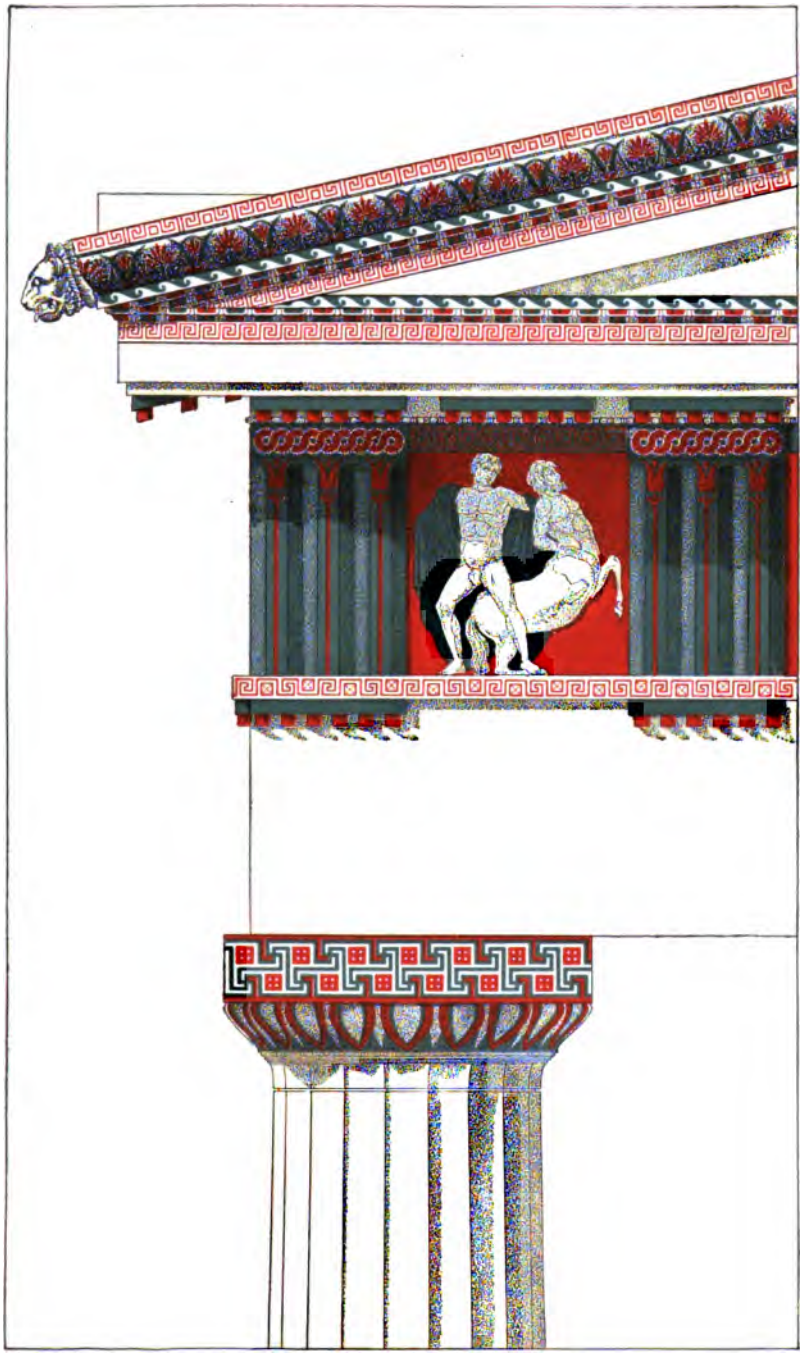


FIG. 69

98. The moldings of the Greek temples were nearly always decorated. In the Ionic order, the decoration was carved in low relief, each detail being most minutely executed, as shown in Fig. 69; whereas, in the Doric order, the decorations were painted but with equal care, as shown in Fig. 70. In each case, the character and outline of the ornament was carefully adjusted to the molding that it occupied. It will be observed, however, that straight, flat surfaces, as the abacus of the columns and the fillets, are decorated with geometrical ornament and frets, whereas the curved surfaces are decorated with various curved forms of honeysuckle ornament, egg-and-dart moldings, etc., the curve of the molding nearly always supplying the motif for the outline of the ornament in the decoration.

The guilloche was rarely used except on the upper torus of the attic base, as shown in Fig. 69. It represented a braided band of straps, and was appropriate to this position, as it



161 § 50

FIG. 70

ostensibly gave strength to the base of the column that it encircled. Between the straps, buttons were sometimes carved, as shown in Fig. 67 (*e*), and a great variety of form was carried through the interlacings and the bands themselves.

99. Greek art carried the perfection of pure form to a point that has never since been reached, and the abundant remains of Greek ornament compel us to believe that refined taste was universal, and that the country was overflowing with skilled hands and minds so trained as to enable them to execute these beautiful ornaments with unerring precision and truth.

The beauty of Greek ornament, however, lies almost exclusively in its *symmetry* and *form*. It is lacking in one of the greatest charms that should always accompany ornament, namely, *symbolism;* and, despite the pleasure experienced in its beautiful gradations of form and color, Greek ornament is meaningless, purely decorative, never representative, and in few cases, in the stricter sense, hardly even constructive.

REVIEW EXERCISES

1. To what geological influence did Greece owe much for the artistic development of its architecture?

2. What is the most artistic period of Greek history?

3. What were the characteristics of the Greeks?

4. What are the principal Greek cities in which they erected architectural monuments of importance?

5. (*a*) In what class of buildings did Greek architecture reach its fullest development? (*b*) Which was the most important building?

6. What are the orders? Describe each.

7. What are moldings? Describe each of the Greek moldings.

8. On a sheet of paper 9 in. × 12 in: (*a*) Design, in color, a border composed of the honeysuckle ornament or anthemion, or both, the design to be 8 inches long and 2 inches high. (*b*) Draw a border similar to the one at the bottom of Fig. 64 and color it in accordance with the Greek idea. This design should be 2 inches high and 8 inches long. (*c*) Design two tiles in Greek coloring, each to be 3 inches square. Each of these designs may be executed on a separate sheet of drawing paper if desired.

ROMAN ARCHITECTURE

(343 B. C. TO 313 A. D.)

INFLUENCES

100. Geographical.—Italy is the central one of the three great peninsulas of Southern Europe, Fig. 71. It is about 700 miles in length, and is separated from the main land on the north by the Tyrolean Mountains. On the other three sides it is surrounded by the Mediterranean and Adriatic seas.

From the map it will be observed that although the peninsula of Italy is long and narrow, the coast is not nearly so broken up into bays and natural harbors as the coast of Greece, and that although the Apennine Mountains run from one end of the peninsula to the other, the land is not like Greece, divided into numerous valleys. Therefore, we at once come to the conclusion that the people that grew up under these two influences were somewhat strongly contrasted. The Romans were not a seafaring people; the Greeks were. The Romans therefore did not colonize in other parts of the world in the same manner as did the Greeks. In the early period, there were no rival cities as in Greece, and since no petty jealousies existed between the smaller towns, the Roman power grew up in a unit by the absorption of smaller states, which was never accomplished by either Athens or Sparta.

101. Geological.—The principal building material in Greece was marble, but in Italy there was not only an abundance of marble, but terra cotta, brick, and granite and other stone were in use all over the country, while individual localities produced a local stone that in many places characterized an architectural development. There was a very hard limestone, tripoli, or travertin; tufa, a volcanic substance

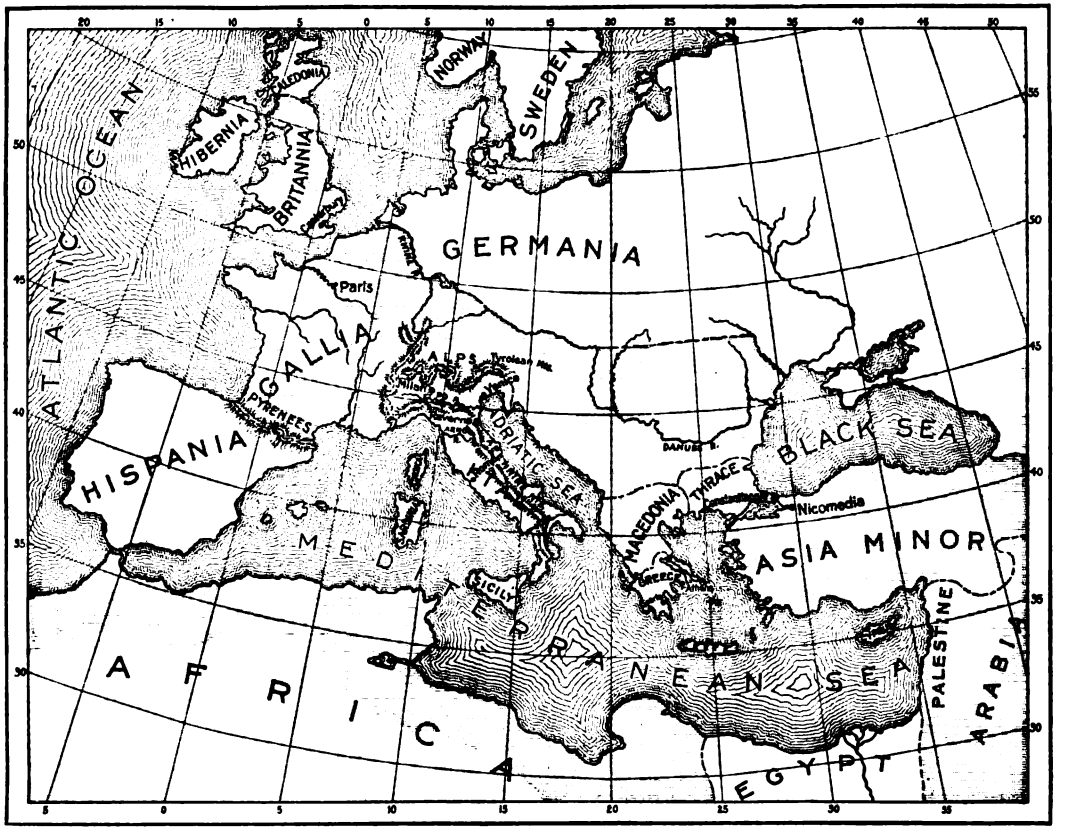


FIG. 71

§ 50

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from the hills about Rome; and peperino, a volcanic stone from Mt. Albano. Besides these, there was an abundance of lava on all sides, excellent sand and gravel, and a peculiar clean, sandy earth found in the district near Rome. This earth when mixed with lime and formed into concrete possessed extraordinary qualities of strength and durability. The walls of Roman buildings were frequently formed of concrete and afterwards overlaid with brick, cut stone, or elaborate and expensive marbles, alabasters, and porphyries from Oriental quarries.

It should be borne in mind that the Roman Empire spread over the entire known world, and as it spread its architecture was influenced by the materials found in various localities where it planted itself. However, the general system of building with concrete and finishing with stone or brick as an exterior material, was a favorite method throughout. In some Oriental cities, such as at Palmyra and Balbek, and in Egypt, stones of enormous size were quarried and used in the buildings locally.

102. Climatic.—The central and southern portions of Italy are sunny and agreeable, and the south is almost tropical. The north is temperate, and in some sections experiences severe cold in winter. On this account, the character of the buildings varies somewhat from one end of the peninsula to the other.

103. Religious.—Ancient Rome was a heathen country, and the worship of the gods was looked on as a part of the constitution of the state. On this account, the emperor was looked on as a person of divine origin, and the temple architecture of the period assumed an imperial appearance, entirely in contrast with the solemn dignity of the Egyptian and Greek temples.

104. Political.—In the earliest period of its history, Italy was occupied by three races. In the northern part, on both sides of the river Po, were the Gauls, a people that did not take part in Roman affairs until a later period. In the central portion, extending from the Arno River to Rome,

were the Etruscans, a people of obscure origin, but of high civilization, who were skilled builders and craftsmen. The religion of the Etruscans was strange and gloomy, but their engineering achievements in the construction of vaults and tombs influenced the architecture of future Rome. In Southern Italy, there were many colonies planted by the Greeks, and these were all included under the name of Magna-Græcia. The form of Roman government was similar to that of Greece; that is, the towns and districts were joined together in a league for mutual protection. The government of Rome was first conducted under a king chosen by the people, and he was assisted by one senator and a popular assembly. In 500 B. C., Rome became a republic, and in 27 B. C. it evolved into an empire. Under Augustus, Nero, and Trajan, building acts were passed that had material influence in the architectural development of the city.

105. Historical.—The history of the Romans is the history of the last of the great people of antiquity. In the 8th century before the Christian era, this great nation had its beginning in a small village, and it subsequently developed until, at the end of the 2d century, A. D., it possessed a vast empire covering the entire civilized world. Although Rome is supposed to have been founded about 750 B. C., the exact date is uncertain, as the republic was engaged in many wars and absorbed most of the Etruscan cities. Rome was defeated about 390 B. C. by the Gauls, who continued to hold Northern Italy. About 343 B. C., however, Rome began a series of wars that lasted 60 years and resulted in the city of Rome conquering the entire country of Italy and in the domination of one city over all. Then came a series of wars with people outside of Italy, and in 241 B. C., Sicily became the first Roman province. In 146 B. C., Carthage, in Northern Africa, was destroyed by the Romans, and this territory became another Roman province. About the same time, Macedonia and Greece fell into Roman hands, and with the fall of Greece in 146 B. C. began the importation of Greek artists and works of art. The Greek Empire had then spread to

Western Asia, but it became a Roman province in 133 B. C. In 55 B. C., Cæsar crossed into Britain.

In the meantime, civil wars were breaking out near the city of Rome itself. The difficulty of governing so many distant provinces under the old system of a seat of government at Rome made the adoption of an empire a necessity, and in the year 27 B. C., Augustus Cæsar was made emperor of Rome and he ruled until his death in 41 A. D. The reign of Augustus was one of the greatest eras in the world's history. It has only two parallel periods in modern times, one of these being the reign of Elizabeth in England and the other in the 19th century, during which great political and commercial developments were recorded. During the age of Augustus, the poets Virgil, Horace, and Ovid, and the historian Livy, were contemporaries. After Augustus came a long line of emperors, of whom Nero, Vespasian, and Trajan all erected buildings that characterized their reign. Under Hadrian, in 138 A. D., the empire expanded to its greatest extent. Following Hadrian came Septimius Severus, Caracalla, and Diocletian, who were the most active emperors in the architectural development of Rome.

Italy ceased farming and cultivation, and depended on imported products. The immense armies required on every frontier necessarily dominated the policy of the government. Emperors were murdered shortly after their election, and chaos set in that weakened the fabric of the great empire. Architecture being neglected, it naturally fell into decay, and until the time of Constantine nothing was done for its revival. About 313 A. D., this emperor issued a decree, called the "Edict of Milan," in which Christianity was accorded the same rights as the official Roman religion, and in 323 A. D. he himself professed Christianity, which then became the official religion of the Roman empire.

106. Social.—The social customs of the Romans materially influenced their architecture as did also the customs of the Greeks and other nations, but from this time forward, as will be observed, the architectural development reflects the

manners and customs more clearly. Therefore, it is found necessary to take this social influence into consideration, as many customs of the present day have been handed down from the early Roman times.

The earliest Romans were a simple people and lived chiefly on bread and herbs, but after their conquests, wealth was acquired and the desire for luxury invaded all ranks. Oriental customs were imitated, and the dignity of the ancient Romans was gradually displaced by social gatherings in which intemperance, gluttony, and debauchery were the leading characteristics. The Roman usually had three meals a day, with the principal meal in the evening, corresponding very closely to the modern way of living. The evening meal was elaborate and consisted of many courses, the variety of which was unlimited. The first courses were followed by elaborate dessert courses, such as pastry and fruit, while liberal quantities of wine were consumed throughout the meal.

The Romans reclined on couches as they ate their meals, the couches being arranged on three sides of a square, so that the slaves could enter on the fourth side to place and remove the dishes. The middle couch was the place of honor. No table cloths were used, but each guest brought with him a napkin that he tied over his breast. Knives and forks were unknown; two spoons were used at each meal. The feasts were usually illuminated by oil lamps, which were exquisite pieces of workmanship in bronze and silver, but the functions were greatly marred by the oil dripping on and soaking the table, while the thick, black smoke curled up and discolored the walls and rested in flakes of soot on the clothing of the guests.

107. The Romans spent much of their time in their large and elaborate baths. A cold plunge in the river Tiber, which served its purpose with the early Romans, gave place under the empire to the most luxurious and elaborate system of hot baths that the world has ever known. The Romans visited their baths as they would their clubs, and took the dip six or eight times a day. The theater, with tragedies

and comedies, the circus and the amphitheater, with their brutal exhibitions, formed the principal amusements. At the circus, they bet on their favorite horses or charioteers, the same as is done in modern times. At the amphitheater, they reveled in the bloody combats of gladiators and beasts, the most brutal of all historical pastimes. Captives, condemned slaves, or convicted criminals were given a chance to save their lives by fighting with another of the same sort. Desperately would these men fight over sand that had grown red with the blood of their fellow men and their own, but with parched lips and aching hearts they fought on knowing that a brave fight would likely win freedom. Combats of gladiators, or professional fighters, were styled feasts, and at times whole armies of them fought at once. When Emperor Trajan returned from his triumph in Asia Minor ten thousand gladiators fought in the arena at one time.

108. The household work was done by various classes of slaves. In the earliest times, a few were sufficient, but during the empire, a separate slave was provided for each piece of work. There were slaves not only to manage the household and to take care of the wine cellars, the bedrooms, the kitchen, etc., but there were slaves to carry the litter and attend to their masters. Some were readers, some were secretaries, some were physicians; others were retained solely for amusement, as dancers and jesters. All of them were ranked under two heads: bought slaves and inborn slaves. There was a slave market in which the more common slaves were bought and sold like cattle, but the more valuable were disposed of by private sale.

CHARACTERISTICS

109. With Roman architecture, the study of ancient architecture ends and that of modern architecture begins. The Roman style of design has been used in modified form throughout all subsequent eras, except the epoch known as the *Middle Ages*, which gave birth to a new style. It will be well to bear in mind all the details that characterize the Greek temples and tombs when following the thread of architectural history through the expansion of the Roman empire. The Romans introduced the arch as an architectural detail, and combined it with the column and beam of the Greek style, thereby giving rise to new architectural forms and practically to new forms of the orders themselves.

As Greek architecture is characteristically a trabeated style, so is Roman architecture characteristically an arcuated style. But there is one great difference in the general character of the two styles. The Greek buildings were simply ornamented construction, the entire system consisting of columns and beams decorated to give architectural character to the building. On the other hand, in the Roman style, the column and the beam played no part in the construction, but served simply as ornament. The walls were built either of concrete or of heavy stone blocks. The apartments were covered over with vaults, and the building could be completed practically in this rough state. The piers that supported the vaults were ornamented by columns placed against them, and the courses between different stories were emphasized by entablatures corresponding to the orders beneath. The semicircular openings that marked the end of a vault were decorated by planting around them a portion of the architectural entablature of the order in which it was found. These buildings could have been stripped of their architectural decoration—their columns, entablatures, and pediments—and structurally they would scarcely have been impaired and no doubt would have been equally as serviceable as before. Strip a Greek building of any of its architectural decorations, and the building itself is destroyed.

As the style proceeds, the arch used only as a decorative feature finally assumes a more structural form, and in some of the basilicas it is found spanning spaces between a series of columns on either side of the aisles. From this isolated position its influence can be traced in the establishment of characteristic forms in the great Gothic cathedrals of the middle ages.

110. Greek architecture was confined almost exclusively to temples and tombs; whereas, Roman architectural constructions consist of baths, amphitheaters, aqueducts, bridges, tombs, basilicas, or courts of justice, fora, or open markets, and triumphal arches—all tending to show Rome's greatness, engineering ability, and skill in using materials at hand with the best possible results.

The refined Greek system of building with large blocks of finely cut stone without mortar was set aside for a more economical system by the practical Roman. The large blocks of stone were used for carved decorations and ostentatious display on the outside of buildings, while the small pieces and fragments from the quarry were mixed with lime mortar and made into concrete for wall construction. Since broken-stone concrete could be made in any country and was easily worked under the direction of a general superintendent, Roman buildings presented a similarity in appearance, no matter whether they were erected in Southern Italy or in Northern Europe. Buildings of this character required only rough labor of the cheapest kind, and any one quite unused to the art of building could be pressed into service. The Romans therefore called on slaves and local subjects that were liable to labor for the state, and even men from the army were pressed into service. The punishment of criminals in many instances included their condemnation to work on public buildings. Thus, we find a condition of affairs that would easily enable the Romans to erect the mighty structures that they did throughout the length and breadth of the empire. Roman ruins in western Europe affected subsequent architecture from Spain to England.

111. One of the strongest characteristics in Roman construction was the use of the vault. All openings and passageways were covered with some form of this device, and a certain freedom of planning was the result. There were no restrictions as to the size or shape of a room that could be covered with some sort of vault. There were three general forms of vault used for this purpose: the *semicircular*, or *barrel*, *vault*, the *cross-vault*, and the *dome*. The first was constructed by simply laying a wooden semicylinder on top of the walls, and laying over it concrete of the required thickness. When the concrete had hardened the semicylinder was removed, and the vault remained a part of the walls themselves, as shown in Fig. 72. The cross-vault consisted of two intersecting cylinders placed at right angles to each other, thus permitting columns to be used in the support under their four groins, or corners, as in Fig. 73, instead of long walls, as in Fig. 72. This permitted long compartments to be covered by a series of vaults supported by intermediate columns. Circular structures were usually covered by domes that were hemispherical in form. These were constructed by laying concrete over a wooden hemisphere that was supported on the circular wall to be roofed.

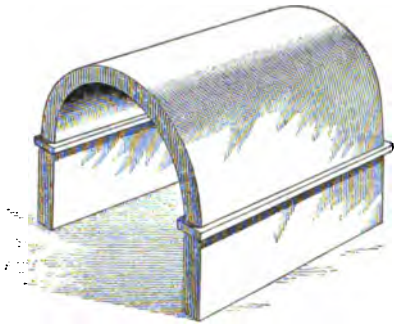


FIG. 72

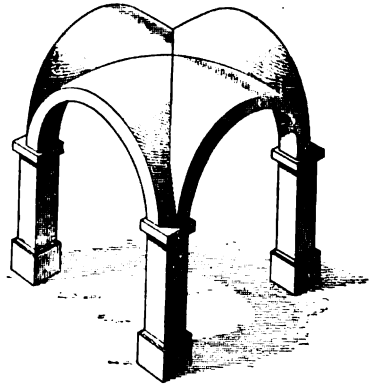


FIG. 73

EXAMPLES

112. Fora.—The **forum** was an open space in the central portion of the city, and was used as a public market or a meeting place for political gatherings. It corresponded closely to some of the public squares or small parks in a modern city. The forum was usually surrounded by elaborate architectural constructions, such as colonnades, public buildings, temples, basilicas, and statues of great men. Rome possessed several fora. As will be observed from the above description, the forum probably consisted more of a group of architectural buildings than of any single architectural detail.

113. Temples.—Roman temples were the result of building from models furnished by Greece with materials and methods used in Rome. The characteristic Roman temple was pseudo, or falsely, peripteral. It had no side colonnades, as in the more important Greek temples, but the *order* of the temple appeared on the sides in the form of attached columns, or pilasters, Fig. 74, while the porch extended in front only, Fig. 75. Steps at the front descended between projecting walls, and these often formed a pedestal for statuary. This pedestal was frequently carried out in detail around the entire building, and was termed a *podium*. Roman temples differed in proportion from Greek temples, the latter being usually about twice as long as they were wide, while the Roman temples were much shorter. The size of the cella was usually increased to the whole width of the temple, and was generally used as a museum for statuary, or as a treasury. There are also numerous examples of circular and octagonal temples. See Fig. 76.

114. Among the rectangular examples found in Rome is the Temple of Fortuna Virilis, Fig. 74, which was erected in 100 B. C. This is a typical Roman temple in plan, being pseudoperipteral, Ionic tetrastyle. Another example of rectangular architecture is the Corinthian Temple of Antoninus and Faustina, at Rome, which was erected 141 A. D. It is

pseudoperipteral and prostyle hexastyle, and is now used as the Church of St. Lorenzo. In France, at Nîmes, there is another Corinthian temple, Fig. 75, now popularly known

FIG. 74

as the Maison-Carree, or square house. This structure was erected in 138 A. D., during the reign of Hadrian, and is the best preserved Roman temple in existence. The entablatures were richly carved, and statues originally

FIG. 75

Fig. 76

FIG. 77

ornamented the pedestals in front. These are typical rectangular temples that remain today, to show us the general character of Roman structures.

115. Of the circular temples remaining, we have the Temple of Mater-Matula, at Rome, Fig. 76, formerly known as the Temple of Vesta. This structure is circular peripteral, of Parian marble, and is approached by marble steps. It was originally domed over the cella, but is now covered with a frame roof directly over the columns. At present it is used as the Church of S. M. del Sole.

The Pantheon at Rome, Fig. 77, is a circular structure having an internal diameter of 142 feet 6 inches, which is

FIG. 78

also its height. The walls are 20 feet in thickness, and contain eight niches, or recesses. In front of each of these recesses is a pair of columns. On the exterior is a Corinthian octastyle portico, the columns of which are 42 feet 6 inches high. The dome over this circular structure is a hemisphere, and is coffered on the interior to form a number of panels. In the center of the dome is a circular opening

27 feet in diameter. This forms the sole means of illuminating the interior, which is shown in Fig. 78. The building is now used as the Church of S. Maria Rotonda.

Another circular temple is the Temple of Vesta at Tivoli, 19 miles from Rome. This structure is peripteral, has a cella 24 feet in diameter, and is surrounded by a peristyle of eighteen Corinthian columns, each being 23 feet 6 inches high.

116. Basilicas. Basilicas were erected as halls of justice, but were often used by merchants as places of exchange. They represent some of the handsomest buildings that ever existed in Rome, and are monuments to the importance that the Romans attached to the affairs of law and equity. They are of interest, too, in their influence on the subsequent Christian architecture, as will be pointed out later. The plan of the basilica was a rectangle, as shown in the Basilica of Trajan, Fig. 79, the length of which was twice the width, or more in many cases. Two, and occasionally four, rows of columns extended through the length of the building, dividing it into aisles, over which

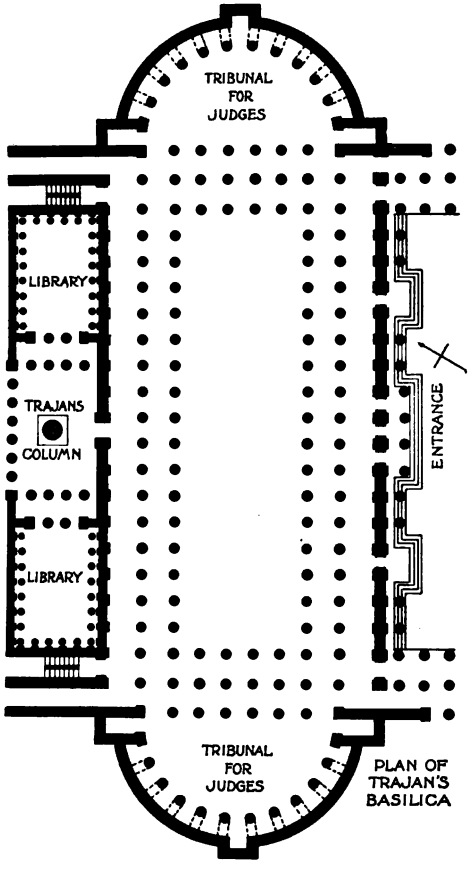
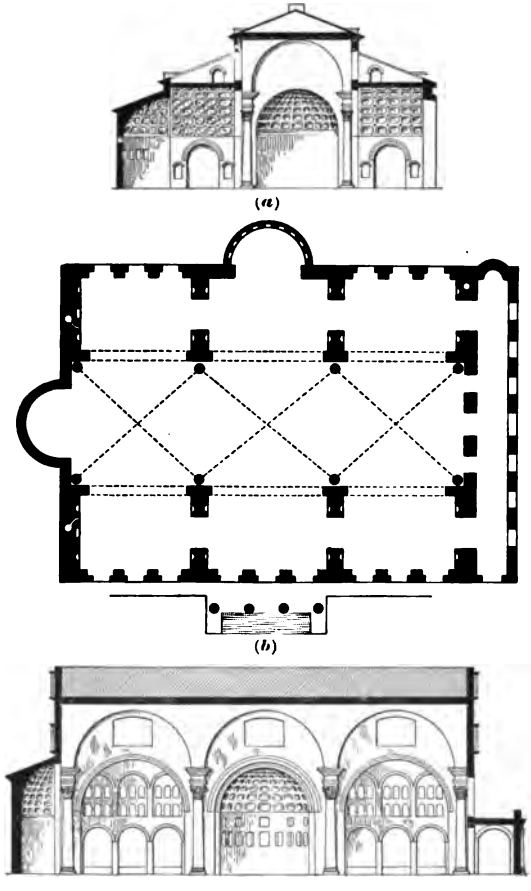


Fig. 79

galleries were sometimes constructed. The entrance was either at one side or one end, and usually opposite the entrance was a semicircular termination called an *apse*, on which was a raised dais, or platform, upon which the tribunal sat. Arranged



(*a*)

(*b*)

(*c*)

FIG. 80

around the platform were seats for the assembled orators and other persons interested in the matters on trial. In front of the tribunal was an altar on which sacrifices were offered before the beginning of all important business. The buildings

were usually covered with a wooden roof, and the exterior was generally simple and unimpressive. The interior, however, was elaborately decorated with marble and carvings.

Other arrangements of the basilica included the vaulting of the ceiling, which was carried on a number of piers, as in the Basilica of Maxentius, Fig. 80, thus avoiding the necessity of many columns. The Basilica of Maxentius was 265 feet long by 83 feet wide, and was crowned by an immense groined vault in three compartments 120 feet above the pavement. The aisles running north and south were roofed with semicircular vaults 76 feet in span. There were two apses, one to the north and the other to the west end of the central nave. Light was introduced by *lunettes*, or circular windows, in the upper part of the nave, through the wall formed by the intersecting vaulting.

117. Public Baths.—The public baths, or *thermæ*, were characteristic of Roman civilization and corresponded largely in their national standing with the gymnasiums of the Greeks. All of these baths are now in ruins, but important remains exist in Rome and Pompeii. However, much interesting information can be found on the subject from writings of the Italian architect Palladio, who, in the 16th century, prepared essays in which they are described. The Roman *thermæ* took the place of the daily newspaper and of the club, and was a general meeting place in social life. Here all Rome gathered to gossip and to hear the news of the day. A small entrance fee amounting to about a quarter of a cent was charged, although later they were thrown open entirely free.

In general arrangement, there was one section set aside for the baths proper, the process of which was very similar to the modern Turkish bath. A warm room, called the *tepidarium*, was provided in which the bathers could rest. Other rooms of varying degrees of heat provided places of extreme temperatures, cold plunges with dressing rooms, rooms for massage and annointment, and places for games, libraries, and even occasionally a theater. In some of the baths, space was laid out as a stadium, with raised seats for

spectators. Various athletic sports, such as races, wrestling, and boxing, took place. Rooms for lectures were provided, and every feature conceivable to add to the pleasure of inland life was made a part of these great institutions.

118. The baths of Caracalla at Rome had accommodations for sixteen hundred bathers. The building and its gardens were raised on a terrace that was 20 feet high and about $\frac{1}{5}$ mile square. Under this terrace were vaulted chambers that were used as stores, furnaces for heating water, and hot-air ducts. It is easy to conceive that buildings as important to the public as these would be richly ornamented and lavishly designed. Sumptuous internal magnificence was desired in all of these great institutions. The pavement was mosaic, being arranged either in geometrical patterns or in inlaid designs representing athletes and dancing girls. The lower walls were sheathed with colored marble, and the upper portion was covered with stucco in bright colors. Columns of granite, porphyry, and alabaster supported the vaults, and these were richly coffered and garnished with ornamental figures in metal and mosaic. The finest sculpture of antiquity was displayed throughout these sumptuous halls, much of it being brought from Greece or executed in Rome by Greek artists. The various basins and plunges were constantly supplied with streams of sparkling water flowing from the mouths of sculptured lions or griffins wrought in polished silver, producing in themselves the most cooling effect during the heavy, sultry, summer weather.

FIG. 81

119. Theaters and Amphitheaters.—The Romans adopted the Greek idea of the theater, but instead of carrying

the outline of the auditorium to more than a semicircle, they restricted it to simply a semicircle. The stage was raised considerably, and was treated with great richness and

FIG. 82

elaboration. Where the condition of the country permitted, the theaters were erected on a side hill; but under other conditions, the art of vaulting enabled them to construct the

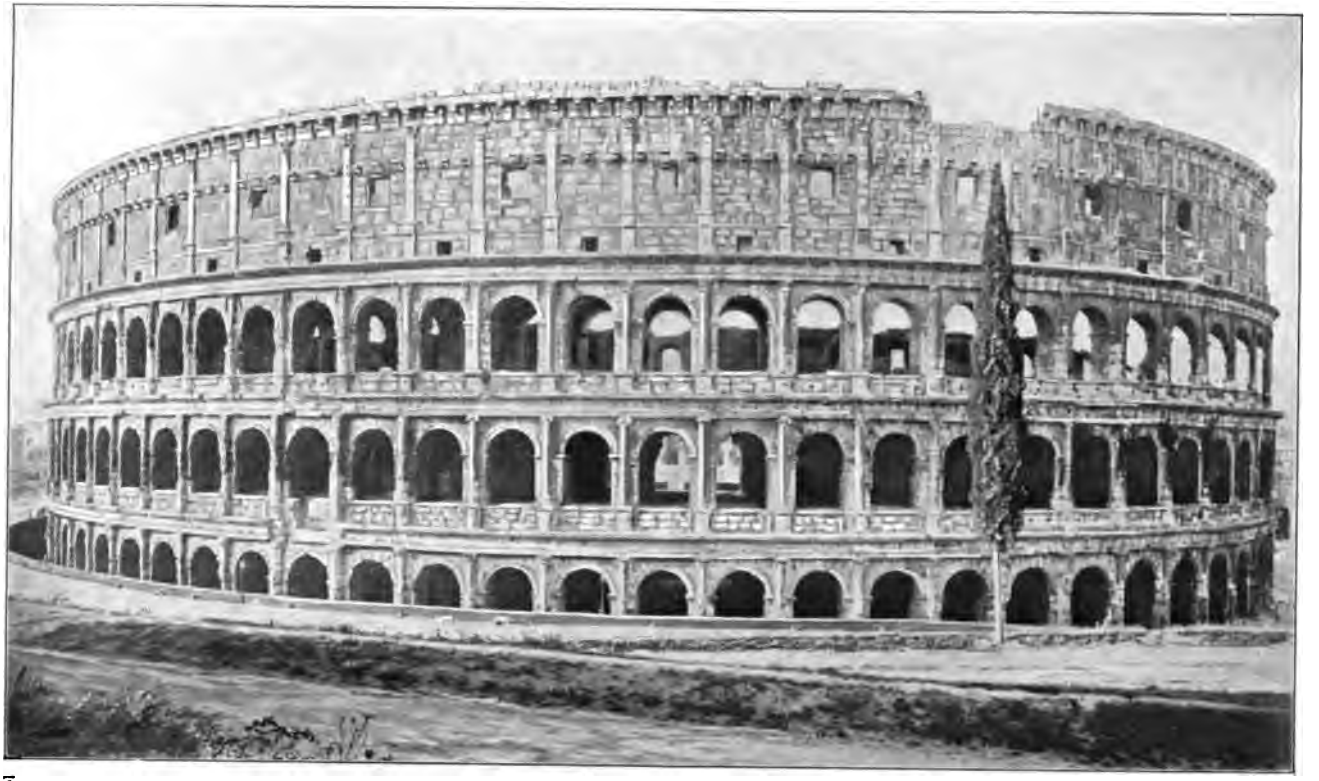


Fig. 83

upper portion on a tier of corridors and get quite the same result. The theater of Marcellus, at Rome, is the only existing example in that city. These arcades were faced in the usual Roman manner with columns and entablatures, as shown in Fig. 81, wherein the Doric order was used in the first story and the Ionic order above. The building has been altered recently by walling up the arches and converting the façade into a solid front, but the outlines of the original openings may still be traced, as in Fig. 82. This structure originally consisted of two stories of arcades around a semicircular auditorium.

120. The amphitheaters, however, are characteristic Roman amusement buildings. They are found in various sizes in every important Roman city, and were used for naval exhibitions, gladiatorial contests, mimic battles, etc.

The Flavian amphitheater of Rome, Fig. 83, usually called the Colosseum, on account of its great size, was commenced in 70 A. D. In plan it was a vast ellipse 620 feet long and 513 feet wide. Each story of this structure possessed eighty openings on the outside wall, those on the ground floor forming entrances. The area of the arena, or center, was 180 ft. × 287 ft. surrounded by a wall 15 feet high. The seats were cut out of solid stone, raised one behind the other from the arena, and were supported by vaulting over corridors and staircases below. Under the lowest tier of seats were located dens for wild beasts, and these opened directly into the arena. In the auditorium, the seats were divided into four ranges, the two lower tiers being separated from the third by means of a wall. Access to the top row of seats, which was added later, was by means of staircases between the radiating walls and by corridors leading from the eighty entrances. On the exterior, the building was four stories in height, the openings being arched in the lower stories and flanked with columns, while the upper story was a flanked wall with pilasters, between which were brackets to support the masts, which in turn carried an immense velarium, or awning, extending over all of the seats. In no building of Roman construction

FIG. 84

FIG. 85

is the character of architecture more clearly expressed than in this. These four stories erected of concrete, with arches between immense piers, constitute the building.

FIG. 86

121. Triumphal Arches.—In Rome it was customary when an emperor or a general won a great victory to erect an arch of triumph in his honor. These structures sometimes consisted of simply a single arch supported by two buttresses and ornamented with characteristic decorations, and often three arches were used—a large one in the middle and a smaller one on each side. Above the architectural composition was usually an attic, or surmounting mass of stonework, carrying an explanatory inscription. The arch of Titus, Fig. 84, is an example of the single-arch type, and was erected in 70 A. D. to commemorate the capture of Jerusalem. On each side of the arch are columns attached to the surface. The archway is ornamented with deep coffers, and on the inner jambs are carvings in relief, one side representing the emperor in a triumphal car and the other showing the spoils taken from the temple at Jerusalem.

Many of these arches still exist, and the arch of Constantine of Rome, Fig. 85, erected in 312 A. D., is a good example of the three-arch type. This was built in honor of the victory over Maxentius. Corinthian columns entirely detached from the structure support the entablature, which projects out over the capital of each column and returns. The attic extends the full width of the composition, which is 76 feet, and elaborately carved figures rest on pedestals over each of the columns. Originally, a two-wheeled chariot and horses surmounted the top.

122. Pillars of Victory.—Pillars of victory, or memorial columns, instead of arches, were sometimes used to record these triumphs. The famous Trajan's column in Rome, shown in Fig. 86, furnishes a good example of this kind of monument. This is a simple column of the Doric order, and rests on a pedestal about 17 feet square and 18 feet high. The column is 12 feet in diameter and 147 feet high. Around it is a winding spiral of sculptures containing twenty-five hundred human figures, besides animals and chariots, representing the extent of Trajan's war with the Dacians.

123. Tombs.—The Romans practiced both burial and cremation, and in their tombs are frequently found sarcophagi and metal urns. There are several varieties of Roman tombs. First, those in which vases of ashes or remains in coffins were placed in subterranean vaults or caves, now familiarly known as the *catacombs*. There were monumental tombs that were square or circular and crowned with a pyramidal roof. The most important of these is the Tomb of Cecilia Metella, near Rome. It is circular, 94 feet in diameter and about 50 feet high from the base to the top of the cornice. The wall is divided into three general parts corresponding approximately to the proportions of the Corinthian order. The wall space occupies the column height and the cornice and base are proportioned to correspond with the entablature and pedestal of the order. The facing and cornice were of marble and the freize was enriched with elaborate carvings of garlands and ox skulls.

The side walls were rusticated; that is, built of stones with rebated joints so as to leave the centers in raised panels.

Originally, the roof was domed over in a somewhat conical form, but during the middle ages alterations were made, and the battlemented, or notched, superstructure was added.

Pyramid tombs, influenced by Egyptian ideas, also existed,

FIG. 87

and smaller, isolated monuments are often seen. In the far East, there were rock-cut tombs.

124. Aqueducts and Bridges.—The Romans did not hesitate to build immense aqueducts for conveying water to their cities. Rome itself required immense quantities of water for public use, fountains, baths, etc. The local service being poor, immense aqueducts had to be built far into the mountains. These aqueducts consisted of a series of arches over which a cement-lined channel was carried, and sometimes formed bridges. The bridges were built across streams on immense arches that extended on piers from bank to bank.

125. Palaces.—Of the Roman palaces, there is nothing left but ruins and a few historical records. Enough remains, however, to show that they were enormous structures of the most imposing character. The chief apartments in the palaces of the emperors were the throne room; the basilica, or justice hall; the peristylium, a square garden surrounded by a colonnade; the banqueting hall; the bathing room; and an apartment set aside for statues of the gods. Besides these, there were sleeping rooms and many smaller apartments, the uses of which have not been preserved.

ANALYTICAL STUDY

PLANS

126. The essential differences between the plans of the Greek and Roman buildings are first, size; and second, refinement. The Greek plans were comparatively small, the proportion being the element of first importance, whereas the Roman plans attempted to give an elaboration of vastness and magnificence. The Romans were great constructors, and did not hesitate to build immense bridges and aqueducts to convey water from great distances. Their entire empire was an example of vastness, and enormous buildings were characteristic of their work. The Greeks were simple, artistic, and refined in their tastes. Each section of Greece founded an example of one or more of the three styles of architecture. Purity and severity of outline of the simple post and beam construction did not lend a great variety, and therefore each building was studied for simplicity in itself. The plan had to be considered in detail first as on it depended the size and spanning of the columns. The Romans took the arch, vault, and dome, and on these keyed the whole system of construction. Unlimited openings could be spanned, and by means of the vault and dome immense areas could be covered. The enclosing and the covering of these buildings were thus simple matters, and it

became purely a matter of ornamentation to appliqué, or "stick on," the architectural orders and their details in order to give style to these buildings. The Greek temples were delicately proportioned, simply designed, and usually orientated; that is, they faced the east. The Roman temples were elaborate and complicated, and no attention was paid to orientation.

WALLS

127. Greek buildings were constructed of large blocks of marble, no mortar being used to unite them, and stability was secured solely by the observance of the laws of gravitation. The buildings were completed and the entire surface polished to give an even finish. The walls of Roman buildings were constructed of small, coarse, and crude materials. Concrete was made of brick or rubble mixed with cement, and was bonded regularly to give it proper strength. These walls were faced with an ashlar of marble or other stone, and the architectural effect was obtained from this facing. The Roman system of building was very economical, as all scraps and chippings could be used to make the concrete of which the walls were composed that enclosed their building.

ROOFS

128. In the Greek temples, the slope of the roof determined the form of the pediment. The eaves presented a row of richly carved antefixæ at the end of each run of tiles, and gargoyles in the form of lions' heads served as spouts from which rainwater was discharged. In Rome, the vault covered all important areas. Wood construction was frequently used, and in many instances formed the decorative element for a ceiling. As a rule, however, the Roman roofs were of terra cotta or of bronze, but the roof formed no architectural detail of the building, as the walls were crowned with parapets and balustrades that effectively hid the roof construction. The pediment, like the orders, was used only as a detail to be appliquéd to the walls.

COLUMNS

129. When the Romans adopted the Greek orders, they altered them materially to suit their own conditions, and the result was not an artistic one. The three simple orders of the Greeks being insufficient for the elaborate constructions of the Romans, two others were invented, the **Tuscan order,** which is simpler than the Doric, and the **Composite order,** which is more elaborate than the Corinthian. In connection with each of the orders, the pedestal was introduced, and although the relation of the diameter to the length of the column varied in each order, the proportions of the pedestals and entablatures remained about the same.

130. In Fig. 88 is shown a group of the five orders of architecture according to the Roman standard, which was first published by Vignola, an Italian author, in 1563 A. D. The height of the Tuscan column *A* is seven times its diameter, that of the Doric *B* eight, the Ionic *C* nine, and the Corinthian *D* and the Composite *E*, ten. The pedestal is always one-third the column height, and the entablature one-fourth to one-fifth.

The Tuscan order seems to be a modified form of the Doric, while the Roman Doric order is a much elaborated form of the Doric. It will be observed in comparing these two orders that the Tuscan column is unfluted and that the base consists of a single torus molding separated from the shaft by a fillet; its architrave and frieze are unbroken, and its cornice consists of the fewest possible simple moldings. In the Doric, however, the base is similar to the Tuscan, but the shaft is grooved with flutes that meet in an arris, as did the Greek Doric column. The echinus is ornamented with an egg-and-dart pattern, while the frieze exhibits the characteristic triglyph of the Doric order and the soffit of the cornice is supported on a mutule. The space between the mutules is coffered and paneled. The peculiar difference between the Greek Doric and the Roman Doric orders is exhibited in the fact that when a triglyph occurs at the end

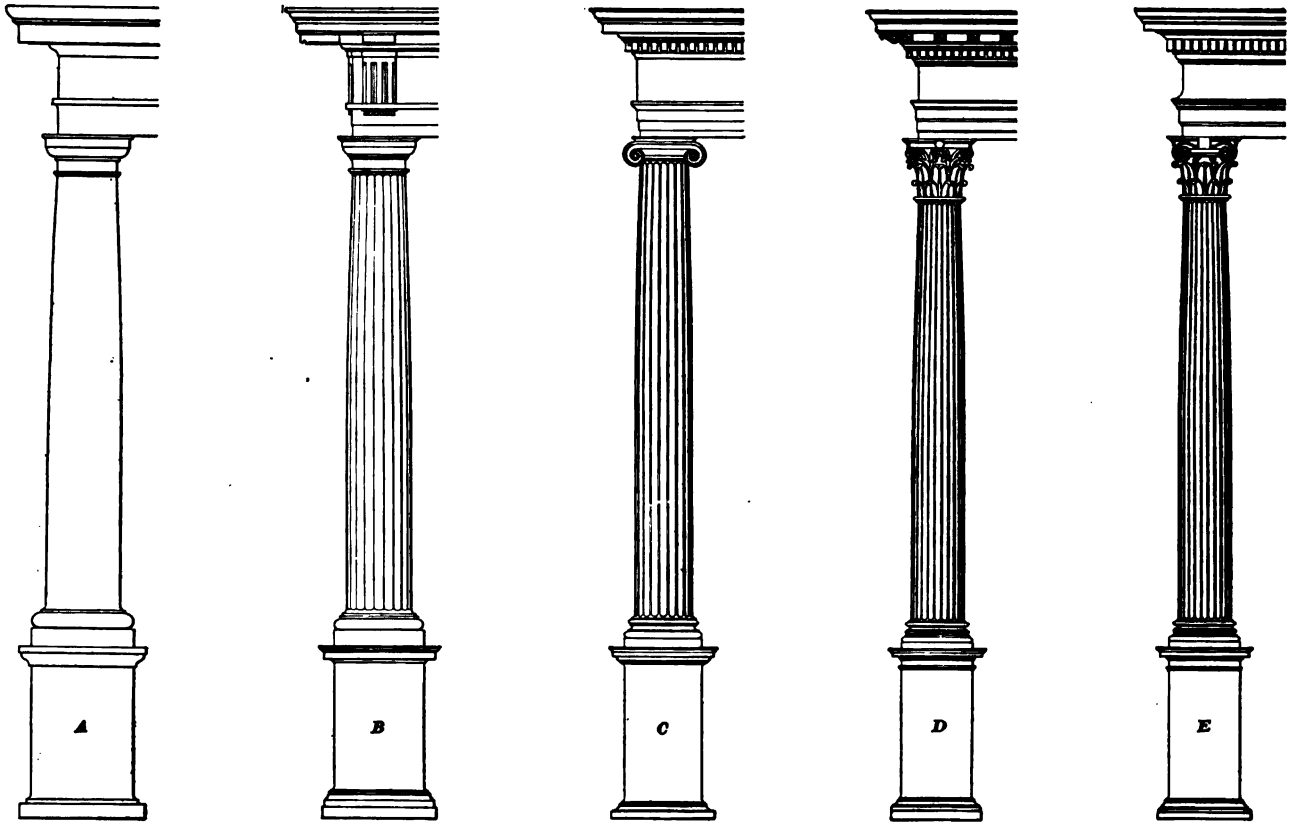


FIG. 88

of a Greek composition, it is placed at the angle of the building, as can be seen in the illustration of the Parthenon, Fig. 42, but in all cases it is placed over the center of the column in Roman style. Moreover, there were two forms of the Doric order characteristic of Roman art—one whose cornice was decorated with mutules, and the other where a row of dentils was substituted, thus practically introducing elements of the Ionic order in the Doric composition.

The Ionic order bears a resemblance to its Greek prototype. The scrolls, however, are smaller and less refined. The base is simplified, and consists of a scotia between a large and a small torus molding. This base is usually known as the attic base. The entablature is rendered more complicated by dividing the architrave into three bands, and frequently by decorating the frieze.

The Corinthian and the Composite orders are practically of the same general proportion and style, the only difference being the amount of ornamentation and elaboration. The Roman Corinthian order is heavier and more elaborate than the Greek Corinthian. Where mutules supported the cornice of the Doric order, a new element in the form of a bracket, or console, was introduced in the Corinthian. The abacus of the capital is no longer square, as the sides are concaved. The Composite order possesses the same characteristic as the Corinthian, except that the scrolls are larger, making the capital appear like a combination of the Ionic and the Composite. In the Corinthian order, the small scrolls at the top of the capital seem to grow naturally out of the foliage, while in the Composite order, the forms of the four-sided corona seem to be set on top of the foliage. The soffit of the corona is coffered in some instances, and large consoles, or dentils, or both, are frequently used to support it. The Composite order was always elaborately decorated, rich carving being an essential part of its composition. The columns were nearly always fluted, but examples exist, as in the Pantheon, where rich granite and marble columns were left smooth to show the beautiful characteristics of the materials. In some examples, the capitals were gilded.

131. From the foregoing, it would seem that the architectural orders as used by the Romans were purely decorative features. Strongly contrasted is this with the orders as used by the Greeks, with whom the columns were structural necessities. A pair of columns and a beam represents the entire theory of Greek architecture. In Rome, however, as has been said before, the orders were appliquéd on the surface of the buildings, and possessed no structural importance whatever. In the Roman art, the columns were frequently superimposed one over another and supported on pedestals. When orders were so superimposed, the arrangement, according to a general established custom, was from the sturdy column of the Tuscan order at the bottom to the more delicate Corinthian and Composite at the top. The lower stories of buildings were usually designed in the Doric order, while the superimposed stories were designed successively in the Ionic, Corinthian, and Composite. In Greek architecture, however, the buildings were apparently never more than one story in height; thus, only one order of columns was used on the exterior. Superimposed orders have been known where galleries existed on the interior, but they are of minor importance and therefore cannot be compared with the Roman system.

132. The Doric order was especially favored by the Greeks and was considered the most important. It was used without a base and is found in all of the most important temples. This order, however, was rarely used by the Romans, as it was too simple for their ideas of splendor.

The Ionic order was executed with great refinement by the Greeks, its capitals showing scrolls on two sides only. This order with the Romans was designed to show four sides of the volutes, and the entablature was greatly enriched.

From the records of Grecian art, the Corinthian order exists in only two cases, and both examples indicate a decline of this art, when sculpture gave way to mere stone carving. It was used in small buildings only, and was simple in form. With the Romans, however, the Corinthian order was favored.

It was used in all of their largest temples and most important buildings. Instead of being simple, the Corinthian is the most elaborate of all of the borrowed orders. The frieze and architrave were elaborately carved, and the moldings were enriched with small ornaments. The consoles and modillions introduced in the cornice were also elaborately carved. In both cases of the Greek examples, the shaft was fluted; whereas, in Rome, the shaft is found to be plain or fluted, according to the material of which the columns were constructed.

The Composite order was invented by the Romans in order to secure a more elaborate scheme of decoration. The Ionic and Corinthian capitals were combined, and the general details of the Corinthian order were elaborated in order to secure the richness demanded by the Roman taste.

OPENINGS

133. In Greek architecture, the openings are of small importance, the treatment of them being severe. The effects of light and shade on the buildings were obtained by the flanking columns. Doorways and windows were square-headed, and occasionally they were crowned by a cornice supported on consoles, as in the Erechtheum. In Roman architecture, however, the openings were features of great importance. Some were square-headed, and some semicircular. The semicircle as a window head was frequently divided by vertical mullions, or sometimes by a mullion up to the center of the arch, where it was crossed by a transom bar.

MOLDINGS

134. Greek moldings were introduced in order to produce refined effects of light and shade on the graceful contour they possessed. Where dentils were introduced, they were well spaced and occupied the whole depth of the molding. The Romans, however, destroyed the contour of their moldings by the introduction of carvings. Greek moldings were

always conic sections; the Roman moldings, sections of a circle. No attempt at refinement of form was made, but every effort was put forth for elaborate display. Roman dentils are placed close together and are not cut to the full depth of the moldings. Under the cornices of the Roman orders, however, consoles are introduced to serve as brackets for their support, whereas the Greeks only use consoles as vertical brackets on the side of doorways, as in the Erechtheum. The Romans occasionally used the vertical console in the center of their arches to serve as a keystone.

ROMAN ORNAMENT

135. It is a difficult matter to find original types in Roman ornament. Most of their ideas were borrowed from Greece and were adapted to their particular purpose. In their carved work, we find less conventionalism than is characteristic of the Greeks, and a stronger tendency to favor elaboration. The acanthus was much used in scroll patterns and on the capitals of the Corinthian and composite orders, but the scroll patterns never presented the refinement of the Greek. Instead of a parent stem from which radiated offshoots, the Roman ornament consisted usually of one scroll growing out of another scroll and ending in a flower, as shown in Fig. 89. The Romans did not excel either in sculpture or painting, and in many cases show great vulgarity of sentiment. They were fine judges of rare marbles, however, and in many instances made up for their lack of

Fig. 89

skill in painting by their tasteful selection of rich marbles for dados, wall surfaces, pilasters, and friezes. These were imported from every part of the known world, and no expense was spared to produce the richest effects possible with these materials. Many of the friezes of the Roman entablatures are decorated with carvings representing ox skulls, between which festoons and garlands of fruit and flowers are hung. These designs are supposed to have originated from actual skulls and garlands that were hung on alters at which these beasts had been slain, thus showing the origin in all its crudity of their decorative motifs. Wall paintings as seen in Roman architecture were probably by Greek artists and are characteristic of the villas of Pompeii. These will be considered later.

ROMAN HOUSES

136. The Roman dwelling was a simple structure, and had its principal apartments on the ground floor. The entrance vestibule was simply an unroofed hall and was generally lined on either side by a row of graceful statues. The floor of the threshold was usually of mosaic marble, in which was inlaid the word *Salve*, meaning "welcome." Beyond this doorway was the atrium, or forecourt, a large central reception hall with wings on either side, from which it was separated by pillars. The floor of the atrium was generally mosaic of colored marble or glass, the walls were carved and painted, and the roofs contained bright gardens in which one could walk in the middle of the day. Beyond the atrium was a large room called the *peristyle*, so named on account of its surrounding line of columns. In the service rooms, could be found sideboards loaded with gold and silver plates, amber vases, beakers of bronze, and glass vessels from Alexandria, the tints of which rivaled the opal and the ruby.

Of course this description is of the residences of the wealthy. The poor people lived the best they could, but as a matter of fact the rich of this period were without many of the comforts and conveniences that the poor enjoy today.

POMPEIAN ARCHITECTURE

137. Pompeii was a distant suburb of Rome. The architecture of Pompeii can hardly be considered a style by itself; it was a combination of the Greek and late Roman. There is every reason to believe that the dwelling houses in Pompeii were copied from dwellings of the Greeks. That Greek artists were employed in their decorations, there is not the shadow of a doubt. These residences consisted of an atrium with a peristyle beyond, around which were grouped the family apartments. The street fronts of the houses were

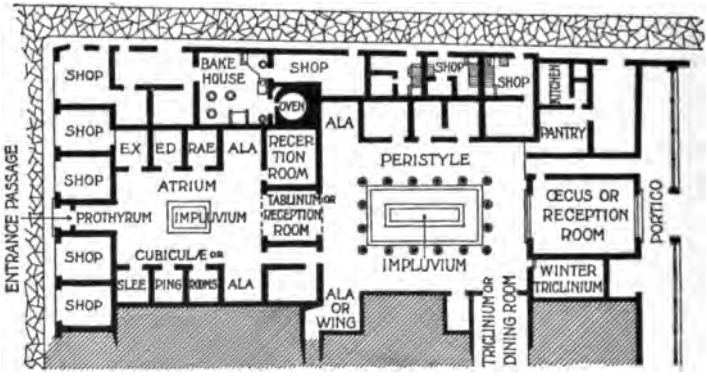


FIG. 90

plain, and were usually occupied as shops, or stores, as shown in Fig. 90. No windows existed toward the street sides, as, owing to the absence of glass or other suitable material, no privacy could be attained with street openings from the rooms. The atrium and peristyle were only partly roofed over, and light entered the private rooms from these apartments, while a basin, or impluvium, in the middle of the apartment served to catch the rainwater as it drained from the roof. As a rule, Pompeian houses were only one story high, but traces of stairways in existing examples tend to indicate that upper floors were occasionally used. The example shown in Fig. 88 is known as the House of Pansa. It faced on three streets and had a garden in the rear.

161 § 50 FIG. 91

138. Pompeian Wall Decoration.—Pompeian wall decoration consisted of a panel treatment wherein the wall was usually subdivided into three parts, corresponding to the pedestal, the column, and the entablature of the orders. The colors were rich and the subjects exceedingly conventional. Representations of villas and balconies in perspective were very common, as was also the introduction of figures, dancing girls, etc., somewhat after the Greek style. The colors used were very brilliant, red and black being used profusely for purposes of contrast. The pictures on the walls were frequently framed with architectural details consisting of slender shafts and delicate entablatures, which were nearly always rendered in a crude form of perspective. Pompeian decoration may be considered as a reflection of painted decorations that could be found in the Roman baths and other public buildings. This is a style that is more characteristic of Pompeii and one that does not associate with Roman art, as all of its elements are far too delicate to be suggestive of the elaborate and ostentatious decorations that must have adorned the walls of Roman buildings. See Fig. 91.

REVIEW EXERCISES

1. What are the chief characteristics of Roman architecture?

2. What new architectural detail did the Romans introduce?

3. What are the essential differences between Roman and Greek architecture?

4. Of what material were Roman walls chiefly built?

5. What were the principal Roman structures?

6. Describe the Roman residence and the manners and customs of the nation.

7. In what manner did the Romans make use of the Greek orders?

8. On a sheet of paper 9 in. × 12 in., make an outline elevation of: (*a*) the arch of Titus; (*b*) the arch of Constantine. Omit all details, but carry out the proper proportions of the orders.

9. Make a drawing of the elevation of the tomb of Cecilia Metella from the description given in Art. **123.**

10. Write out a complete description of Fig. 75, 76, 77, or 83, giving every detail so that a drawing of it could be made from your written description. A similar description is given in Art. **123.**

EARLY CHRISTIAN ARCHITECTURE

(300 A. D. TO 604 A. D.)

INFLUENCES

139. Geographical.—In 323 A. D. Emperor Constantine removed the capital of the empire from Rome to the old Greek city of Byzantium, now generally known as Constantinople (see map, Fig. 71). Before this time, many of the Roman emperors lived in Milan, Nicomedia, and other cities, but the transfer of the capital to a Greek city indicates how completely the Roman Empire had grown to overshadow the city of Rome and even the peninsula of Italy itself. It should therefore be borne in mind that during all of the period heretofore discussed, the term *Rome* applied practically to the civilized portion of the continent of Europe, and that the city of Rome was a small factor after the empire was established. On the death of Theodosius, in 395 A. D., the Roman Empire was divided between his two sons, and from that period the history of Rome divided itself into two distinct epochs and the architecture of the world developed into two separate styles. The Western, or Latin, Empire preserved many of the customs and traditions of the old Romans, but the Eastern, or Byzantine, Empire, absorbed Oriental ideas and gradually developed new systems, different government, religion, and architecture.

140. Geological.—Roman buildings, many of which were in ruins and scattered from one end of the empire to the other, not only afforded material from which Christian structures could be built, but at the same time influenced the architectural treatment by furnishing ideas as to how the buildings could be erected. The Christians, in erecting churches for their own purposes, took the ready-made columns

from the Roman structures and either adapted them at first to their new conditions, or adapted the conditions to the architectural style of the ancient Roman days.

141. Religious.—No event in history presents so remarkable a phenomenon as the rise and spread of Christianity in the 4th century A. D. After the Romans adopted Christianity as a state religion, in 324 A. D., it spread to the furthermost corners of the empire, a diffusion that was rendered possible only by the condition of the other religions at that time. As far back as the time of Augustus, several religious beliefs were recognized throughout Rome, but with the exception of the Jews, all were pagans and polythiests. The religious rites performed by the Romans in their temples were decidedly political and failed to impress the populace with any deep respect for the deity, and it was evident on every side that the people had little faith in their gods and therefore were ready to adopt a new religion that was simple and easily understood.

142. The persecutions of the Christians in subsequent periods of Rome were not religious persecutions, but political ones. The Roman Empire had ever been noted for its tolerance of the religions of other nations, but Christianity was a religion, not of a nation, but of a sect, and it stated that all other religions were false, must be abandoned, and through its disciples it endeavored to draw into its ranks as many as possible from all walks of life. The Christians held their meetings in secret places and in the catacombs, and thus effected a strong and numerous body that was considered dangerous from a political standpoint. But their recognition by Constantine raised them at once to a political body of Rome, and all obstinacy that had heretofore impeded Christianity development was at once swept away, and though not emanating from a nation, the religion dominated the Roman people and was destined to dominate all Europe. The early Christian architectural period is generally taken from the reign of Constantine to the reign of Gregory the Great, about the years 300 to 604 A. D.

143. Political and Historical.—While Oriental civilization was exerting its influence over the Eastern Roman Empire, the Western Empire, comprising what was afterward Italy, France, and Spain, continued to exist as the Latin country. The Gothic tribes that had for centuries inhabited the countries to the North, had ever been dangerous enemies of Rome, but their contact with the Romans acquainted them with Roman civilization and its Christianity, and the Goths gradually became Christians by the teachings of a bishop named Ulfilas. The invasions of Italy from the North commenced about 376 A. D., and the various barbaric tribes clustered around the northern part and finally crossed and conquered Rome in 476 A. D.

In the latter part of the 4th century, the Tartars and the Huns, being driven from Eastern Asia, invaded Europe, defeated the Goths, and established a new kingdom of Hungary north of the Danube. The Goths appealed to Emperor Valens, who then ruled at Constantinople, to allow them to cross to the south side of the Danube. Permission was granted on the barbaric condition that they should give up their children and their arms. This being agreed to, Roman boats were provided, and the fugitives were transferred apparently according to the agreement. However, although they surrendered their children with little concern, they paid all they had in money to bribe the Roman officers to be allowed to keep their arms. In this way a million souls settled, sword in hand, within one of the natural frontiers of the Roman Empire. Almost immediately, disagreements arose and they turned their arms against Emperor Valens and advanced toward Constantinople. In 378 A. D., the first battle took place at Hadrianople, where Valens lost his life. The Goths then spread themselves over this fertile country to the confines of Italy and the Adriatic Sea.

Under Theodosius the Great, who succeeded Valens, the Goths settled down to live with the Romans in peace, and many of them took service in the Roman armies. At the death of Theodosius, however, they revolted, and precipitated themselves on Italy and completely overran the peninsula.

144. The Western Empire was now fast dissolving, and in the early part of the 5th century, Britain was evacuated by the Romans and was soon overrun by the Angles and Saxons, barbaric tribes from Northern Germany. The Teutonic tribes from the North rushed into Gaul, and from Gaul into Spain. Spain was conquered by the Vandals, a Moorish tribe from Northern Africa. The Huns that had driven the Goths into the Eastern Empire, now started under Attila to conquer the world. With this intention, a half million savages crossed the Rhine and pierced the center of Gaul, but were soon defeated by the united power of the Romans, Goths, and Franks. Attila then entered Italy, where he was again defeated, and finally he returned to his kingdom of Hungary. No sooner had Attila departed than the Vandals from Africa crossed and anchored their ships at the mouth of the river Tiber. They attacked and captured the city of Rome in 455 A. D., and for two weeks the Vandals and Moors wrecked and pillaged the city, carrying shiploads of captives and treasures back to Carthage. During all of this time there were still emperors in Rome, but the real power was in the hands of the barbarians, and the emperors themselves were merely figureheads until 476, when the barbarians overthrew the emperor and their leader Odoacer was proclaimed king of the peninsula of Italy. The Roman Empire was thus broken up, and the separate countries of Europe left to take form.

145. As previously stated, the period of early Christian architecture extends from the reign of Constantine, 300 A. D., to that of Gregory the Great, 604 A. D. During the reign of Gregory the Great, the Latin language and the early Christian architecture, which was based entirely on Roman principles of construction, ceased to exist, and for 200 years new languages developed in different parts of Europe, while architecture was practically at a standstill. The languages that developed in the different sections were all based on the Latin tongue, but through the influence of the conquering barbarians, Spanish, French, English, German, etc., were

developed. During these two centuries, the traditions of ancient Rome were gradually forgotten. Each country had its own king and was occupied solely in its own affairs. The Church grew in power and preserved the thread of history. Through the influence of the Church and the necessity of working economically with the materials at hand, instead of following the heavy engineering methods of the Romans, a new style of architecture developed.

CHARACTERISTICS

146. Early Christian architecture developed so gradually from the Roman style that it is practically impossible to tell where one style ends and another commences, and this is the case throughout all periods of art, although the transition stage is more apparent as we advance toward the later styles. The early Christians had very little money at their disposal, and in order to erect a place of worship, a method of construction had to be followed that required few tools and economical materials. Roman temples were now useless for their original purpose, as the old pagan religion had disappeared, and where these temples were large enough and in suitable condition they were adopted just as they stood for the purpose of Christian worship. New churches were occasionally built on the model of the old Roman basilica, and in these new constructions, columns and other details from the ruins of classic buildings were frequently introduced. Therefore, in these early Christian buildings are found columns of different sizes and orders, with no attempt at proportion of diameter to height. If a column were too short, pieces of stone in the form of a plinth were placed below it; if too long, it was cut off. Thus we find a lack of symmetry and unity in the details of these buildings, strongly illustrative of the poverty of the time. However, though this period may be of interest to the archeologist, the buildings erected are of little value to the architectural student, as they present no distinct style, or even a borrowed style, but a reunion of materials to serve the new purpose.

147. The early basilican church had three or five aisles. In one form of these churches, a wooden roof was used as a covering, after the manner of the Basilica of Trajan, Fig. 79, while in others the roof was vaulted, similar to the Basilica of Maxentius, Fig. 80. From one form of this early Christian church, the Gothic style of architecture developed in Western Europe; from the other form, the Byzantine style in Eastern Europe.

148. The plan of the basilica as used by the Romans for a hall of justice was accepted by the early Christians as the most suitable arrangement for their particular form of worship. These structures served as stepping stones to the Gothic cathedrals, which certainly were developed from the basilican plan. So suitable has this plan proved that down to the present day few alterations have been made in it. The semicircular apse, raised and railed off from the main part of the building, was a most suitable place for an altar, while the wide, open aisles provided ample space for the assembling of the congregation.

When structures were erected later, purposely for the use of the church, the same plan was adhered to, and the buildings were still called basilicas. But instead of keeping all the aisles parallel with the length of the building a cross-aisle, called the *transept*, was introduced near one end, and the sides of the building were extended somewhat at the extremities of this aisle, thus converting the rectangular plan to the form of a cross. The center aisle from the transept to the entrance then became known as the *nave* of the church, and the part from the transept to the apse was called the *choir*. The nave was usually built to extend above the roofs over the side aisles in order to form a clearstory for the admission of light, and windows were introduced in the side walls for the same purpose. The walls at the ends of the church, however, and particularly those of the apse, were left solid in the early basilicas and were decorated with paintings and mosaics.

EXAMPLES

149. The first three edifices erected solely for the purpose of Christian worship, were the basilicas of St. Peter, St. John Lateran, and St. Paul. The first named was by far the finest, being 380 feet long and 212 feet wide. All three possessed five aisles (though later basilicas were limited to three), and the central aisle, or nave, of St. Peter's measured 80 feet across.

The structures each fronted on a large, open courtyard, or *atrium*, where converts to the faith and candidates

FIG. 92

for baptism assembled. The atrium was considered a most important adjunct to the early basilicas, but was abandoned when, after the fall of the Roman empire, the church became an independent power and structures were erected in remote districts, away from the influence of their early Roman prototypes. In the Roman residence, the atrium had been the place where all functions were held and it thus became a natural adjunct to edifices where Christians assembled for worship.

150. The interiors of these buildings were rich in effect, and elaborate wall decorations of glass mosaic were frequently placed in a broad band around the nave arcade and lined the bottom of the apse at the end, as shown in the basilican church of St. Paul, Fig. 92. This illustration also shows the rich timber ceiling divided into compartments that were elaborately decorated and gilded.

The pavements of these structures are also details of great interest, as they were made of stone and rich marbles laid in geometrical bands to produce a pattern. Old columns were cut into slices, thus forming central circles around which patterns could be worked in other stone.

There were in all thirty-one basilican churches in Rome, all of which were made up largely of fragments of early pagan buildings. They were very similar in general detail, and the basilica of St. Paul is characteristic of their general style.

151. Baptisteries.—Baptisteries form another class of building characteristic of early Christian architecture. Originally, these structures were used only for baptismal ceremonies, from which they derive their name. Their form, which is usually circular, was derived from the circular tombs and temples of the Roman Empire. As a rule, the baptisteries were detached buildings adjoining the atrium of the basilica, and not until the end of the 6th century was the baptismal font placed within the walls of the church.

152. Tombs.—One of the first Christian tombs recorded is that erected by Constantine for his daughter, in 330 A. D. This tomb had a dome 35 feet in diameter and was supported upon twelve pairs of granite columns. It was converted into a church in 1256 A. D.

It will be observed that a great change of purpose has taken place in tombs since the days of early Egypt, when the final resting place for the dead was but a small chamber in an immense stone structure like the pyramids. Tombs and temples were separate structures then, but thereafter the tombs of important personages were erected in the churches.

ANALYTICAL STUDY

PLANS

153. The early Christians adopted the basilican model for their churches, but at the same time pressed into service public halls, baths, dwelling houses, and pagan temples, so that each of these structures had some influence in the development of the later church plan.

WALLS

154. The walls were constructed somewhat according to the old method, of rubble and concrete, and were faced with some decorative material or plaster. Internally, glass mosaic was largely used.

ROOFS

155. Roofs of wood covered the nave and were supported by ordinary trusses, which gave them a slant for the shedding of water and presented an opportunity for the decoration of the visible framework within. The aisles were also covered with a wooden roof, though sometimes vaulted, and the apses at the end were generally domed over and lined with mosaic.

COLUMNS

156. In the early Christian buildings, the columns were taken from Roman constructions that had fallen into decay, or that were purposely destroyed to obtain building material. These early Christians were not good craftsmen and were unable to create anything original for themselves. Thus, today, we find in nearly all of the most important early churches of Rome, columns taken from ancient Roman buildings. These columns were frequently different in diameter, design, and order, so that no uniformity was attained.

OPENINGS

157. The doors and windows were usually semicircular-headed, after the pagan model. The windows were small and were confined to the aisles of the church. The nave of the church was lighted by a series of small windows high in the nave wall, forming a clearstory above the aisle roof, which thus established a detail that afterwards became characteristic of the early Gothic church.

MOLDINGS AND ORNAMENT

158. The moldings are of the crudest possible character—unskilled attempts to work out the Roman types resulting in very crude effects.

Color predominated in all the decorative attempts, most of the effects being obtained by mosaic. Long friezes of figures above the nave arcades and between the clearstory windows were executed in mosaic. The background is usually of gold, and the figures are simple and well suited to the position they occupy, but the method of working is crude, no attempt being made at neatness or uniformity in joints and bedding. Such ornament as can be derived from the laying of geometrical patterns and mosaic pavements are characteristic of the general ornament of this period.

159. Taken as a whole, the early Christian period represents the transition from the ancient to the modern. It is not a style borrowed by itself and possesses none of the characteristics of an individual style, but it is the stem from which branched the two great styles of the middle ages—Byzantine in the East and Romanesque in the West.

A clear understanding of this period is necessary in order that the student may follow closely the development of the two subsequent and contemporary styles. These two styles are destined, under the peculiar religious and political influences that followed, to blot out all memory of the pure classic forms, for a thousand years.

REVIEW EXERCISES

1. Between what dates is the period of early Christian architecture included?

2. What are the characteristics of the basilica plan?

3. When was Christianity made the state religion of Rome?

4. What were the characteristics of early Christian buildings?

5. When did the individual countries of Europe begin to form under separate governments?

6. In what countries of Europe were there Roman remains to influence later architectural constructions?

7. Under what rulers or statesmen were the greatest architectural developments: (*a*) in Greece? (*b*) in Rome?

8. Write a short essay upon the development of architecture and ornament from the days of early Egypt to the beginning of the 4th century A. D., illustrating where necessary with pencil sketches or tracings.

HISTORY OF ARCHITECTURE AND ORNAMENT

(PART 2)

MEDIEVAL ARCHITECTURE

1. From the early Christian architectural style developed the two great structural systems of the middle ages—the Byzantine in the East and the Gothic in the West. The former was based directly on Roman designs rather than on a transitional style that intervened between the fall of Rome and the perfection of the system, whereas the Gothic style was slowly evolved from the Romanesque, which in itself was developed from the early Christian endeavors to use the Roman structures for their Christian ritual.

The Byzantine style was at once rich with colored marbles, elaborate mosaics, and tiled pavements, as Byzantium was the capital of the Eastern Empire and a rich commercial center, with the artistic spirit of Greece and the splendor and extravagance of Rome ever before it as models of architectural style, whereas the early Gothic style was economical and bare, depending for its beauty entirely on the proportions of its parts and the relative value of its masses. Gothic architecture developed in parts of Europe where the splendor of Rome had failed to reach, and the people were in no position to try to rival the wonders of the capital city, yet they accomplished this without knowing it.

BYZANTINE ARCHITECTURE

(395 A. D. TO 1453 A. D.)

INFLUENCES

2. Geographical.—The ancient city of Byzantium, now known as Constantinople, lies between the Black Sea and the Sea of Marmora, as can be seen by referring to the map shown in Fig. 1. The Strait of Bosporus washes its shores,

FIG. 1

and thus it occupies one of the finest commercial sites in Europe.

It was originally called "New Rome" for the reason that when Constantine became emperor he changed the capital of the Roman Empire to the Oriental city on the Bosporus, which, like its predecessor, was built on seven hills between two great waterways.

3. Geological.—Byzantium possessed no good building materials. Stone was scarce, and there was no clay suitable for brickmaking. Therefore, the building materials of the capital of the Eastern Empire had to be imported from quarries across the Mediterranean.

4. Climatic.—Byzantium was a hotter city than Rome, so that on settling there the Romans changed their habits and methods of building to suit the Oriental conditions and climate.

5. Religious.—In 324 A. D., Constantine established Christianity as the religion of the state, and this brought an important influence to bear on the developing architectural style. When, in 395 A. D., the Roman Empire was divided into the Empire of the East and the Empire of the West, a division of the Church followed, owing to a difference of ideas concerning ecclesiastical rules governing the introduction of sculptured portraits in church architecture, and other practices. The Eastern Church disapproved of the use of any form of carved images. Painted figures in the decorations were tolerated, but sculptured ones were not. The Western Church insisted on graven images of the saints and martyrs, which the Eastern Church held was idolatrous. Consequently, when the eastern emperors lost all power in the Western Empire, the Eastern Church became an independent establishment.

6. Political and Historical.—Constantine's system of government was an expansion of the despotic methods of the Cæsars of Rome (see Roman Architecture, Historical Influences, *History of Architecture and Ornament*, Part 1), and the removal of the capital from Rome to Byzantium enabled him to control the valuable commercial advantages of the latter city. At his death, however, rival emperors claimed the throne and disputes arose in the Church through parties siding with the different claimants, until finally, in 395 A. D., the empire was divided into two parts. One division, comprising Italy and the western provinces of Gaul and Spain, was then known as the Western, or Latin, Empire,

under Emperor Honorius, and the other, which included the Greek and Oriental civilizations of Hellas, Macedonia, Thrace, and Asia Minor (see map of Greece, *History of Architecture and Ornament*, Part 1) was known as the Eastern, or Byzantine, Empire, under Emperor Arcadius, a brother of Honorius.

7. Byzantium was originally a Greek colony, and it retained traces of Greek influence in its art. Byzantine architecture developed into a distinct style after the removal of the capital from Rome to the banks of the Bosporus, and this style included not only buildings in Byzantium itself, but also those erected in cities under the influence of the Eastern Empire and the eastern branch of the Church.

During the reign of Justinian, about the middle of the 6th century, the Eastern and Western Empires were reunited under one emperor for a short period, and during this reunion Byzantine influences spread into Italy and Sicily and permanently marked buildings erected during that period. The city of Ravenna (see Fig. 25) grew in importance owing to the fact that the emperor resided there in preference to Rome, and it was afterwards created a *See*, or town in which the bishop of the Church resided. The creation of a See was a matter of vast importance in the development of a town. Churches were built wherever a congregation or parish required one, but where a cathedral was erected the town became a See and the seat of the bishop's jurisdiction. The building of the cathedral not only brought a multitude of craftsmen to the town, but it gave the community importance politically, ecclesiastically, and commercially. After the Western Empire was claimed by the Goths, in 476 A. D., Ravenna remained the residence of the Gothic kings and rivaled Rome in importance. From 539 to 572 A. D., Ravenna was the residence of the governors appointed by the Byzantine emperors, and the Byzantine style flourished there until Constantinople was taken by the Turks in 1453. Venice in Northern Italy, Monreale in Sicily, and other cities in Greece and Russia were especially influenced by the Byzantine style,

CHARACTERISTICS

8. The chief characteristic of the Byzantine style centers in the new principle of design arising from the development of the dome as a system of roofing over the areas of the plan. This point should be clearly understood, as it was the dome in the East that led to the development of the Byzantine style, and the vault in the West that gave rise to the Romanesque and Gothic styles. The change developed was from the original Roman forms, but was gradual and progressive, and in the course of two centuries Byzantine architecture existed as a style by itself.

Generally speaking, a Byzantine building consisted of a brick construction no more architectural in its details than the concrete constructions of the Romans. The walls were sheathed with rich marbles or bricks, and the domes were decorated with brilliantly colored glass mosaics against a golden ground. The heart of the wall was occasionally built of concrete, as in the Roman method, and the bricks used simply as a surface treatment. The bricks, however, were not laid in regular courses as in the Roman and modern methods, but were set in geometrical patterns to form a fretwork, chevron, herring-bone, or other design that added variety to the appearance.

The dome, however, is the characteristic detail of the style. At Rome, domes had been constructed only over circular and polygonal buildings, but in Byzantine work are found square apartments that are successfully domed by bringing the angles together to form a **pendentive.**

9. In Fig. 2 is shown a diagram of the Byzantine system of construction, *a b c d* being the rectangular plan that is to be covered by a circular dome. Four heavy masonry piers *a e*, *b f*, *c g*, and *d h* are constructed at the four angles of the plan, the spaces between them being spanned by four arches, as *e k f*, *f l g*, etc. Thus far the construction does not differ widely from that practiced by the Roman architects; but in order to dome the enclosed area, the angles were also arched

over until, at the crowns of the first arches, the plan became circular, as at *k l m n*. The inside of the spherical triangles thus formed at *e n k*, *f k l*, etc. are called *pendentives*, and are as characteristic of the Byzantine style as is the dome itself. Over this circular opening *k l m n*, the dome *o p q* was constructed, resting directly on the pendentives in the earliest structures, but in the more advanced buildings raised on a cylindrical superstructure, as *n o*.

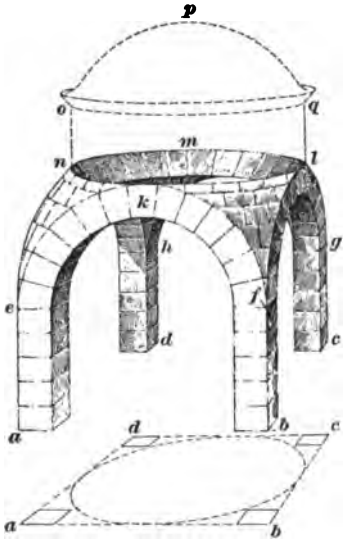


FIG. 2

10. Domes and semidomes covered all spaces, and were built of light, porous stones, such as pumice. Some domes were constructed of terra cotta or light pottery, thus characterizing the architecture by the introduction of brick and other clay compositions. The bricks were large and flat and were laid up in a system derived not from Rome but from Asia. Small domes were grouped around the larger ones, giving a picturesque effect, and no attempt was made to disguise these forms externally. One can readily see from the exterior of a building exactly what the interior arrangement presents (see Figs. 3 and 5). Here, then, is a contrast to the Roman system, although the style was based on a similar principle. The columns and entablatures could be stripped from the Roman buildings without injuring their construction, but if the Byzantine buildings were stripped of their decorative features, exterior vaults, and domes, the construction itself would be destroyed.

The classic orders were dispensed with. New capitals developed that still bore some relation to Roman prototypes, but were Oriental in character (see Fig. 11).

11. The procedure for the erection of a building was a most simple one. The plan being determined on, the first consideration was to collect the marble shafts that were to support the interior walls and galleries. It was absolutely necessary that the quarries from which these shafts were to be obtained be thoroughly understood before the foundations were commenced, for on the length that these columns could be quarried depended the height of the building. The details of the columns therefore became one of the first considerations, and when that was settled, the body of the structure could be proceeded with. The shell representing the outer and inner faces of the wall of the building was built of narrow bricks carefully laid in mortar, and when thoroughly dry this shell was filled in with concrete and sheathed with marble. The great piers that were to support the pendentives under the domes were next constructed; then the domes were turned over the tops and their soffits overlaid with mosaic.

The problem was essentially one of roofing. The plan was laid to suit the purposes involved. A fireproof roof of stone must then be constructed to render the building permanent. This heavy roof had to be supported and demanded strong columns and heavy piers for that purpose. Decoration formed no part of this fundamental architectural problem. These essentials had to be met before any consideration of ornament could be entered into. When form of plan, columns, and roof were determined, however, the question of decorative detail asserted itself. The supporting columns could be made ornate by sculptured capitals and polished shafts. The flat side walls could be encrusted with costly and elaborate marbles, and the hollow soffits of the domes could be overlaid with mosaic.

EXAMPLES

12. Byzantine architectural examples consist mostly of churches and baptisteries. A few of the former follow the basilican style, but the majority are based on the circular and polygonal plans of the Roman and early Christian tombs.

13. Church of Hagia Sophia.—The great church of Hagia Sophia, Fig. 3, built by Emperor Justinian in 532 A. D., is the earliest monument purely Byzantine in style and one of the really great buildings of the world. A peculiarity of this monument and its style is the fact that it presents so perfect an example of an original style with so little transition toward that style.

The emperor declared that he would erect a church, "That should be the grandest monument ever built by man," and the governors of even the most distant provinces of the empire were ordered to ransack all the ancient Roman buildings for sculptures, precious marbles, and works of art, to be used in this edifice. Eight columns of pure white marble were brought from Palmyra, and eight more of deep-green marble were stripped from the temple of Diana, at Ephesus, and shiploads of costly relics were brought from all sections of the empire to become a part of this great structure.

14. The plan and construction of this edifice is no less remarkable than the scale and treatment of its interior decoration (Figs. 4 and 5), and it stands to Byzantine architecture as the Parthenon stood to the Greek and the Pantheon to the Roman. Unfortunately, this church is now converted into a Mohammedan mosque, and the severity of the Moslem religion required that its beautiful interior decorations should be covered from sight by repeated applications of whitewash over which Arabic inscriptions were inscribed.

The plan of the church of Hagia Sophia, as shown in Fig. 4, was an adaptation of the Basilica of Maxentius (see Fig. 80, *History of Architecture and Ornament*, Part 1), and

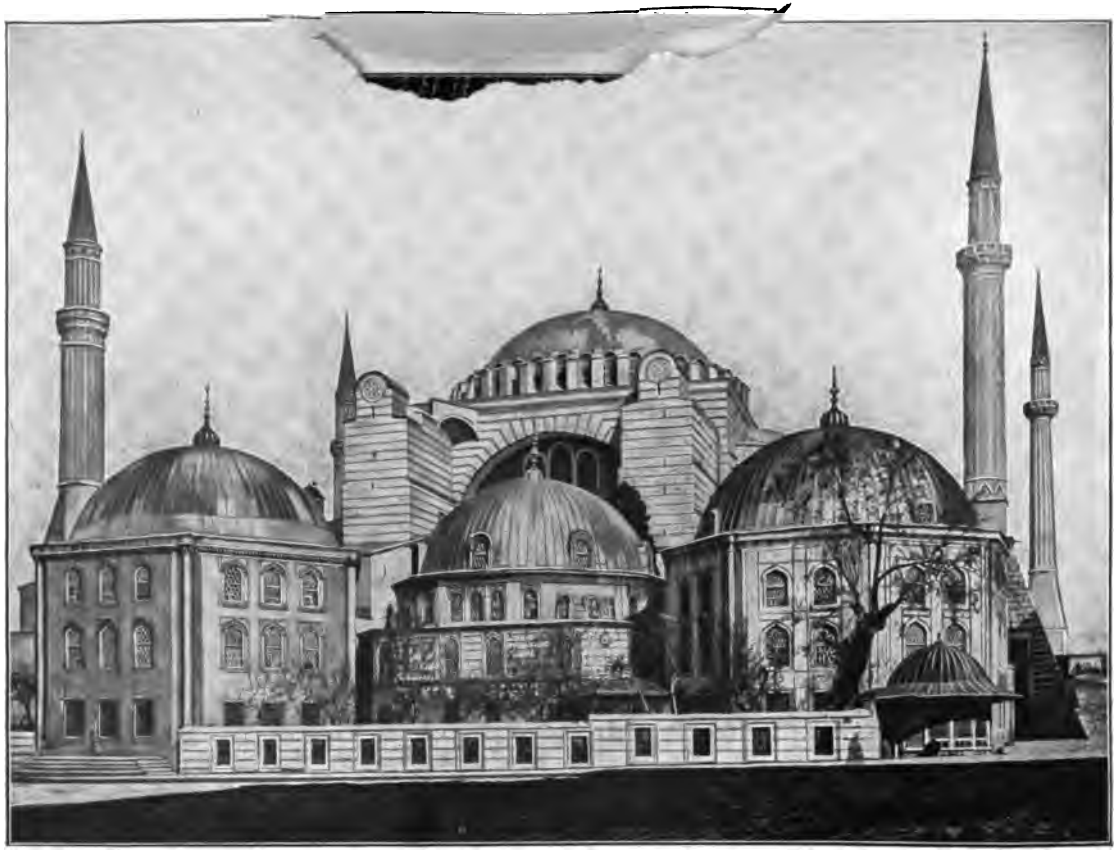
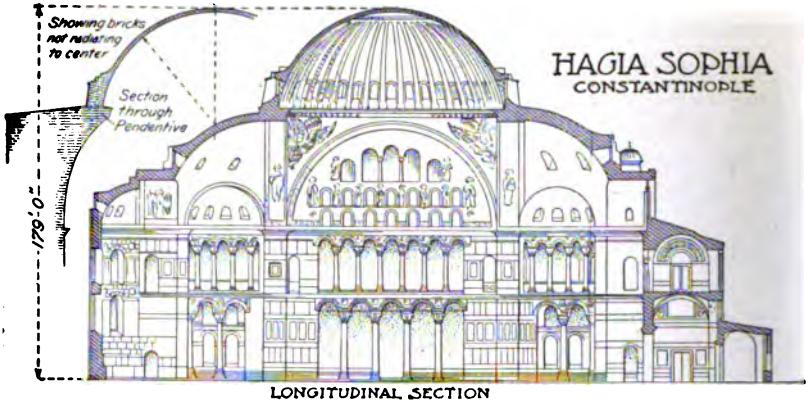
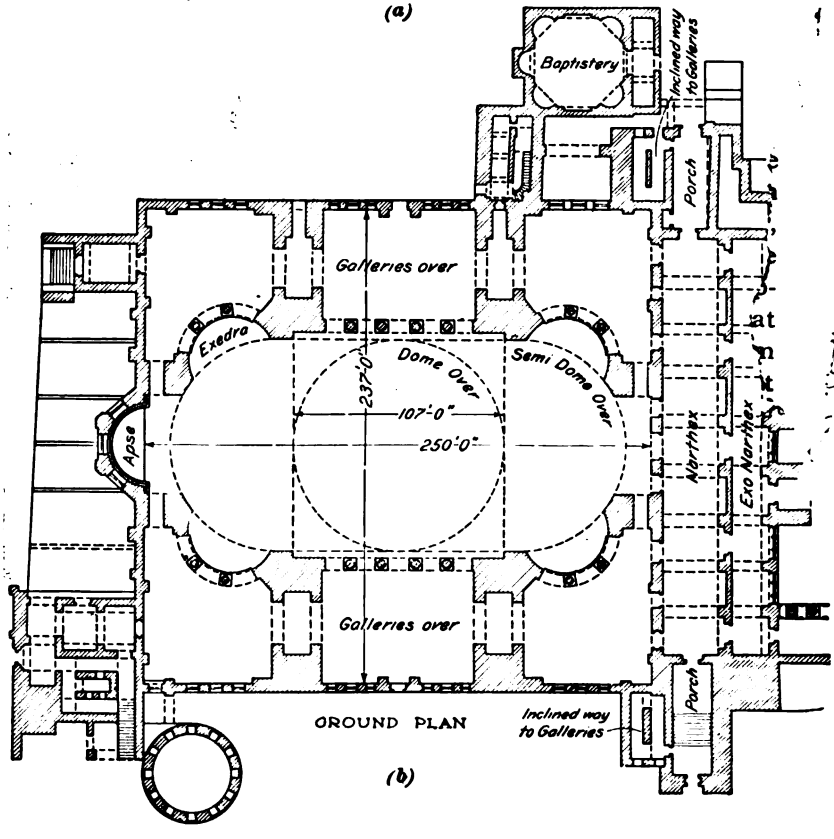


Fig. 3



LONGITUDINAL SECTION

(a)



GROUND PLAN

(b)

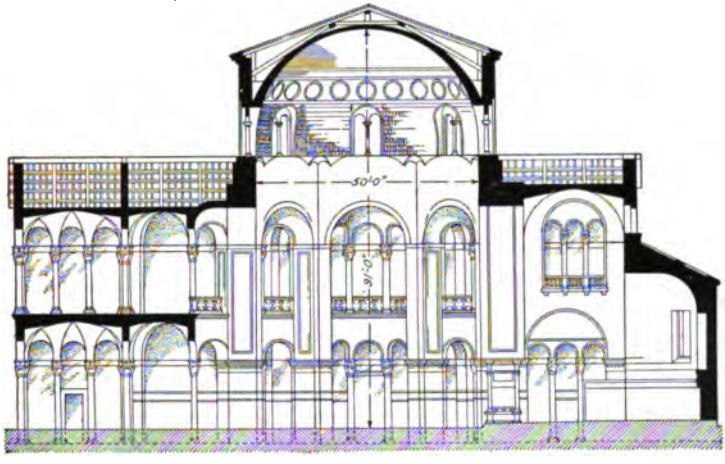
FIG. 4

FIG. 5

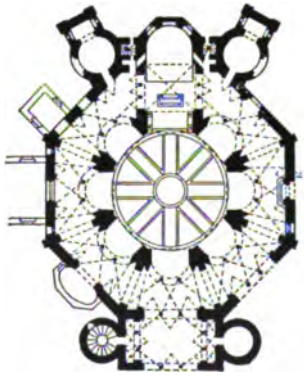
consists of a central square 107 feet on each side, at the corners of which are four massive piers 25 feet in thickness. These piers are connected above by semicircular arches supporting a dome 107 feet in diameter, as shown in the interior view, Fig. 5. It will be well to compare the construction here illustrated with the diagram shown in Fig. 2. East and west of this dome are great apses crowned with semidomes, out of which are further extensions also domed over. An oval-shaped nave 250 ft. × 107 ft. is thus established, around which aisles 50 feet wide are constructed, thus approximately reducing the total structure to a square. The square central space is crowned 179 feet above the floor with a dome that in itself is over 47 feet in height, being less than half a sphere. The semidomes over the semicircular extensions to the nave are constructed so that their crown strikes the base of the main dome and acts as a brace or buttress against it, as shown in Fig. 4 (*a*).

15. Church of St. Vitale.—As has already been mentioned, the city of Ravenna was greatly influenced by the Byzantine style, and here is located the church of St. Vitale, the plan and section of which is shown in Fig. 6 and the interior in Fig. 7. The character of the Byzantine interior treatment can be better studied here, as no infidel hand has whitewashed it over. Rich mosaics and rare marbles cover every available wall space from the tile mosaic floor to the soffit of the hemispherical dome. The interior is lighted through eight mullioned windows that pierce the drum of the dome. The drum is supported on eight arches; each of which is closed on the outside by a semidome upheld by two columns. The capitals of these columns are marvelous products of the carvers' skill. [See Fig. 12 (*b*).] This edifice was modeled after the temple of Minerva Medica, at Rome, and is octagonal in plan, the inner octagon being 50 feet in diameter and the outer one 110 feet.

16. Church of St. Mark.—In Fig. 8 is shown the church of St. Mark, at Venice. This structure was erected at the end of the 11th century, and shows remarkable



(*a*)



(*b*)

FIG. 6

FIG. 7

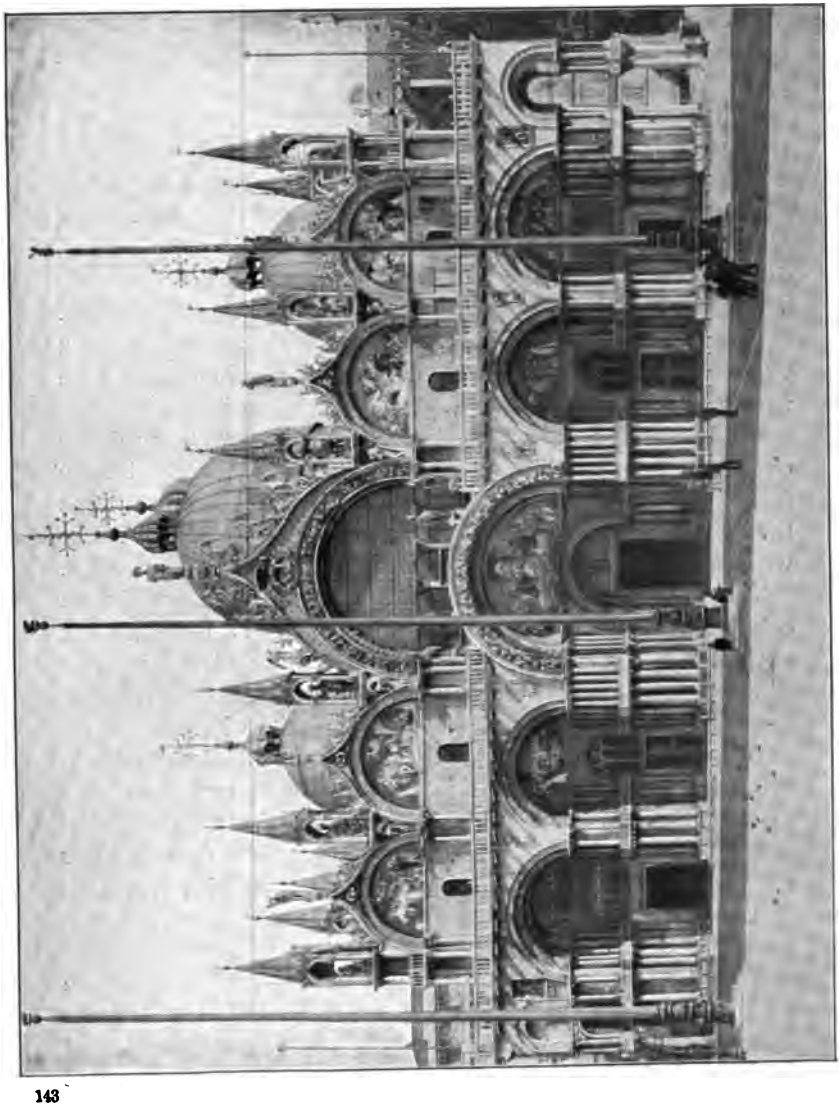


FIG. 8

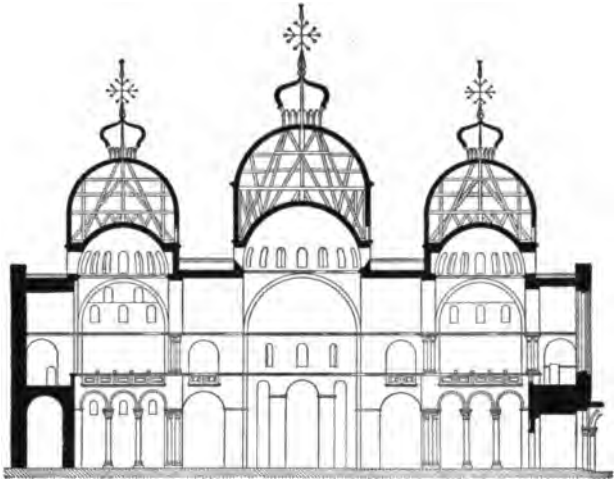
Byzantine characteristics that were undoubtedly brought to Venice through geographical influences, as this city was one of the connecting links in the commerce between Byzantium and Western Europe.

The plan of St. Mark's, shown in Fig. 9 (*b*), presents a Greek cross with four equal arms, over one of which and over the intersection are turned domes 32 feet in diameter, whereas a smaller dome exists over three of the arms. The plan also shows that the great piers supporting the central domes are pierced by archways in both directions, subdividing them into four smaller piers on the ground plan. On the western arm of the crucial plan, an arcade forms a vestibule around three sides, making this portion of the plan nearly square.

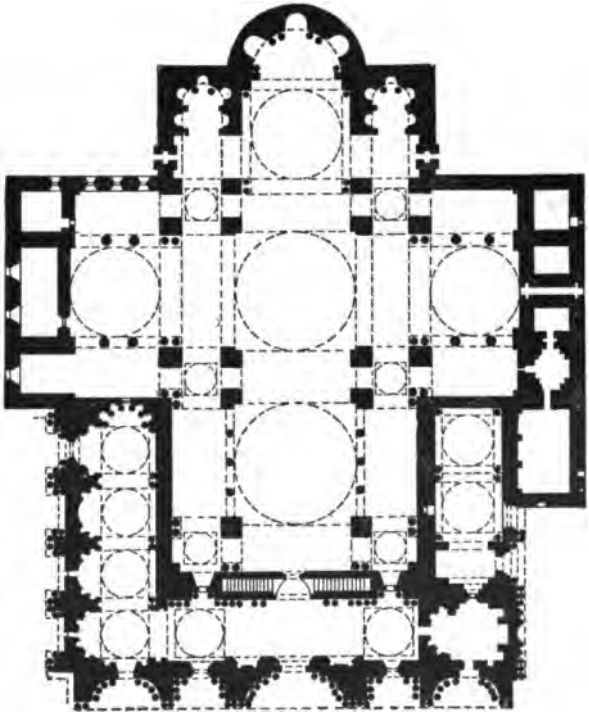
In the section shown in Fig. 9 (*a*) a low masonry dome over the center and side arms may be seen, together with the false and greatly elevated wooden domes erected to serve as the roof and at the same time give exterior effect. These wooden domes are of later date than the original construction.

The interior of St. Mark's, Fig. 10, is richly veneered with colored marble and mosaic. The latter is used almost exclusively in the upper parts of the walls and the interior of the domes. This mosaic presents illustrations depicting scenes from the lives of the saints, portraits of the martyrs, and scriptural subjects, all set off against an elaborate background of gold. The interior of St. Marks appears richer than St. Sophia, but this is due to the fact that all the elaborate mosaics and decorations of the latter were destroyed or painted over when the Mohammedans secured possession of the city.

17. Other Byzantine Structures.—In Greece there are many small but beautifully executed buildings in the Byzantine style, and the cathedrals of Moscow, Keif, and Novgorod, in Russia, are developments along these same lines.



(*a*)



(*b*)

FIG. 9

FIG. 10

ANALYTICAL STUDY

PLANS

18. The characteristic Byzantine plan presents a square central space covered with a dome supported on pendentives, as in Figs. 2, 4, 9, and 10, and the purely structural character of the pendentives is clearly shown in Fig. 38. On each of the four sides of the central space arms extend, thus forming a Greek cross. The whole is enclosed by walls supporting the galleries, thus making the plan nearly square. Compared with the early Christian basilica, it is found that the Byzantine church tends toward a condensed plan and effective interior height, the crowning feature being the central dome, around which smaller domes, or semidomes, are grouped. The early Christian basilicas presented a long and narrow plan, by which an effective perspective of interior columns was obtained, together with a dominating influence of horizontal lines.

WALLS

19. The walls consisted of an exterior and interior shell filled in with concrete. The interior shell was elaborately decorated with marble and mosaic, and occasionally a decorative effect was attained by laying the brick of the enclosing shells in chevron, herring bone, and other ornamental patterns.

ROOFS

20. The main portions of the buildings were covered by a series of domes, usually appearing externally in their actual form. Sometimes, the domes were built of pottery or terra cotta, this light material causing little thrust against the walls. The early domes were lower than a hemisphere, Fig. 6, but later they were raised on a drum, which was pierced with a series of windows, Fig. 7.

COLUMNS

21. As in the early Christian structures, the Byzantine columns were first taken from ancient buildings. The supply in the East, however, was limited, and it soon became exhausted. Thus, the necessity of designing new columns presented itself more quickly than it did in the West. The shafts were of rich marbles turned from a single piece and polished to bring out the veinings. The capitals originally in design show the influence of the Roman orders in many cases, Fig. 11.

OPENINGS

22. Semicircular window heads are general throughout the Byzantine style, but segmental arches and horseshoe openings are occasionally seen.

The windows are small and grouped, rather than scattered. The extensive application of mosaic for decorative effects on the broad wall spaces, dome soffits, and pendentives, fulfil the place occupied by stained glass in the Gothic style. Large windows were not practical in the Byzantine churches. The climate, too, had much influence on this, as it was warm and sunny, necessitating numerous small openings that would tend to keep out the heat and at the same time give the necessary light. Delicate carving and stained-glass effects were therefore impractical, as there was not sufficient light to set off the former nor sufficient window space to display the latter.

MOLDINGS

23. The moldings were unimportant and were used simply to separate spaces of elaborate mosaic work without any attempt to develop pleasing forms of contour, or outline. The few moldings that were used were based on classic models, but the classic moldings were not followed with any degree of fidelity. There was no set system of moldings as in the classic or later Gothic styles.

ORNAMENT

24. In the East, around the city of Byzantium, architecture was influenced by the art of Assyria and Persia. In fact, its entire character became tinged with an Oriental spirit, and this spirit in the course of three or four centuries did much to develop a new and entirely different style of art and architecture, known as *Byzantine.*

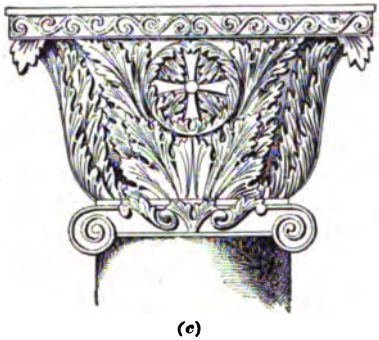
The scheme of ornamentation was most elaborate. The richest marbles that could be procured were used for the lower portions of the walls, and the natural veinings were arranged so as to form geometrical patterns. Glass—mosaic, and symbolic figures representing groups of saints and signs of the Evangelists were inlaid against a golden ground. The small amount of carving used was in low relief, and the effect was frequently produced by sinking portions of surfaces. The acanthus leaf was cut in sharp relief, with the holes between the lobes deeply drilled. The style of the acanthus carving was more Greek than Roman.

One of the strongest characteristics of Byzantine ornament, compared with classic ornament, is that the design seems to be cut *into* the surface instead of being applied to it, the surface always remaining flat and the pattern so cut as not to break its outline. There is a characteristic Grecian influence pervading all Byzantine ornamentation, which would naturally be the case, as Byzantium was originally a Greek city.

25. The capital shown in Fig. 11 (*a*) is from one of the columns in the first tier of arches in the church of Hagia Sophia, at Constantinople. The scrolls in the upper part of this column undoubtedly have their origin in the Ionic order, and, though the entire capital is decorated with the conventionalized acanthus leaf, it is widely different from any Roman model. Here the block of the capital is sound and heavy, and at its bottom is a foliated ring that seems to bind it together, while the carved leafwork grows out of the top of the column and enters materially into the construction of the capital itself.

(a)

(b)



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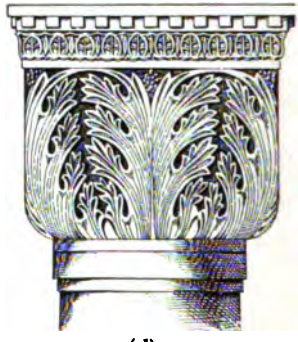
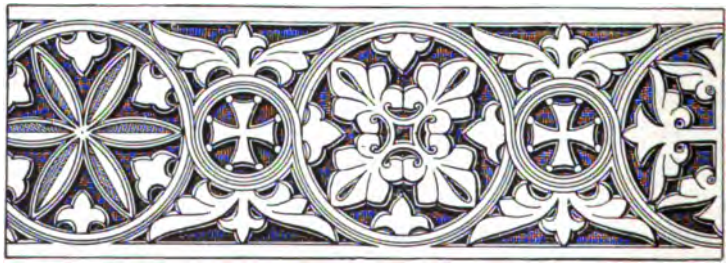


(d)

(e)



(f)

FIG. 11

In another Byzantine capital, shown in (*b*), the place usually occupied by the abacus is filled by a heavy semi-pyramidal form on which the ornament seems to be applied as a surface decoration more than a component part of the construction.

In (*c*), a capital from St. Mark's Church, at Venice, the volutes at the top of the column, the shape of the capital as it swells out to the abacus, and the general character of the details suggests the Roman Corinthian order.

In (*d*) is shown another example of Byzantine capital, from Italy, that is even more freed from Roman influence than that of the previous example. The long, elliptical curves formed by the leaves, the sharp-pointed lobes, and the deep indentations are all indicative of its Byzantine origin.

26. The *running ornament* is illustrated in Fig. 11 (*e*). The leaf form here is thoroughly conventional, and, though tending slightly toward a scroll, is governed by a continuous wavy line, from opposite sides of which the leaf forms branch.

In (*f*) is shown an example of geometrically arranged running ornament from the church of Hagia Sophia. The main geometrical forms, as will be observed, are circles. These circles, however, are not formed complete in themselves, but result from the crossing and intersection of two wavy lines precisely the same in general character as the wavy line that forms the governing element in (*e*). In (*f*), however, instead of branching foliage from opposite sides of the lines, geometrical figures are arranged within, and foliated forms with the cross of St. George are used to form prominent details of the design.

27. The capital shown in Fig. 12 (*a*) is from the church of St. Vitale, Fig. 7, at Ravenna. The peculiar-looking birds on the upper part, as well as the sharply indented foliage, are characteristic of this style, as is also the geometrical pattern and the wandering-vine border line, throwing off its leaves on alternate sides.

(*a*)

(*c*)

(*b*)

FIG. 12

That the capital of the column is cut in full relief is clearly shown, as the light shines through the screen work into the stone interior. The dark portions of the capital were originally gilded, and must certainly have presented a most remarkable effect.

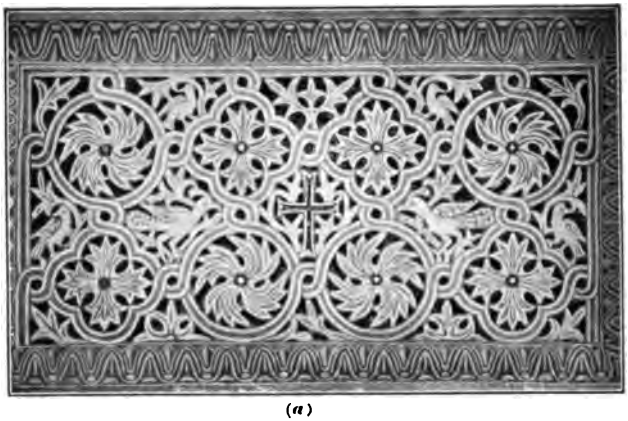
Over the balcony above the altar in Fig. 7 are three arches supported on columns, details of which are shown in Fig. 12 (*b*). The walls, soffits, and spandrels of the arches are laid in mosaic.

28. In giving examples of Byzantine ornament, nothing could be more characteristic than the stone panels herewith illustrated. The style of the ornament itself, the character of the carving, and the development of the geometrical pattern are all details that are shown here in a most characteristic Byzantine form.

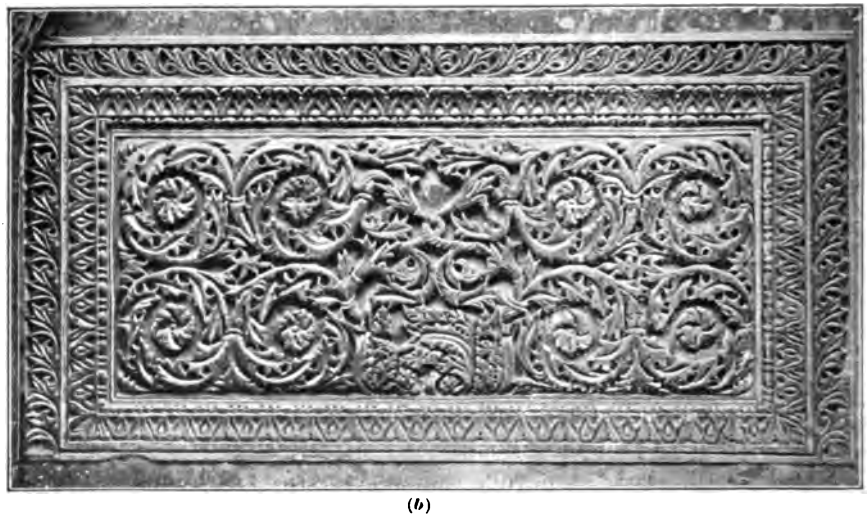
29. The pierced screen shown in Fig. 13 (*a*) is from Ravenna, and illustrates the geometrical pattern based on an arrangement of circles, in which is carved the typical Byzantine leaf. The cross outlined in the center was emphasized in the original by a plating of gold, and the spaces around the foliage were filled with birds, the peculiar modeling and conventional outline of which are characteristic of the Byzantine style. Another characteristic of the style, shown clearly in this illustration, is the sharp, angular cutting of the leaves, the deep circular and elliptical openings between the lobes of two adjacent leaves, and the tendency of the whole panel to appear in high relief on a dark ground rather than to be pierced through entirely.

In (*c*) is shown another screen of the same character. In this example, the interlaced bands that form the geometrical outline of the foliated ornament were originally gilded, and the leaf forms carved between them are similar to those in (*a*).

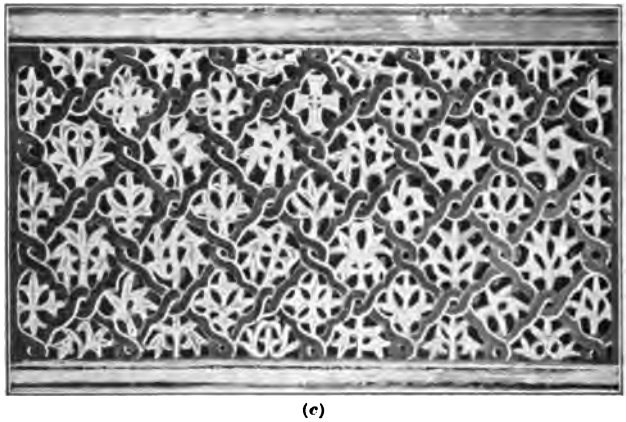
30. The screen shown in Fig. 13 (*b*) is from St. Mark's, at Venice, and its design is based on identically the same motifs as the screens that have already been studied. The carving, however, though in high relief, does not pierce the screen, and the border of the panel, as well as the treatment



(*a*)



(*b*)



(*c*)

FIG. 13

of the foliage within the panel, shows a highly developed Byzantine feeling. However, the influence of its proximity to Rome on the treatment of the scroll forms is apparent. In the central part of the panel the running vine, with its leaves branching from each side is missing, but there is a partly controlled tendency to grow one scroll out of another —a tendency that is so well kept in submission that it does not materially affect the delicacy of the design.

31. In the same church is found a panel, Fig. 14 (*a*), the rounded forms of which are not often found in this style. The severe conventionalism of the foliage treatment is characteristic, however, as is also the preservation of balance and symmetry. On one side, the vine runs off the panel both at the top and the edge, and on the other side, it runs off the panel at the top only. One of the two central leaves extends over the molding of the panel frame; the other is carved entirely within it.

32. Fig. 14 (*b*), however, shows a trend in a different direction. Here the openings in the screen are larger, the exterior portion of it being outlined with a design undoubtedly derived from the Greek fret, while in the center a large Latin cross divides the panel into four smaller rectangles. It will be well to observe the running foliage around this panel, and its branching leaves and fruit, alternately from opposite sides, and to note the difference between this style of treating foliage and that of the Roman and Greek artists, where continuous foliage was accomplished by growing one spray, or stem, out of a calyx, or cup, from which a scroll emanated.

33. In Fig. 12 (*c*) is shown a well at Venice, the details of which illustrate clearly the strong, bold, outline effect characteristic of Byzantine carving. The guilloche border around the top and the leaves patterned after inverted anthemions are suggestive of classic origin, but are treated with such strong Byzantine effect that the classic taint is fairly obliterated.

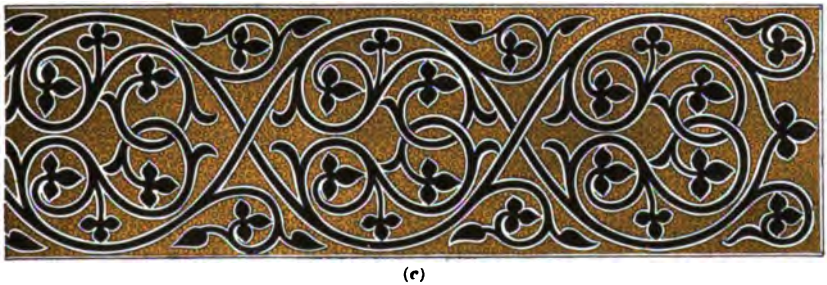
(*a*)

(*b*)

FIG. 14

(*a*)

(*b*)



(*c*)

(*d*)

(*e*)

FIG. 15

34. Color in Byzantine ornament was a very important factor, as the walls of the churches were richly overlaid with mosaics and frescoes in which the color theme was most magnificent. Gold was largely used for backgrounds and took the place of yellow, while the other two primaries, red and blue, formed a part of the theme.

The gold-and-black borders shown in Fig. 15 (*a*), (*b*), and (*c*) are characteristically Byzantine both in their geometrical construction and color contrasts. The three-leaved sprig conventionally and symmetrically introduced with the circle is a very simple combination that has been endlessly varied in different designs. It will be well to study borders (*a*) and (*b*) carefully and to observe how similar they at first appear, and yet on careful scrutiny how materially they differ. The border at (*c*) being absolutely symmetrical, can be used to advantage both in a vertical and in a horizontal position. These interlacing forms, based on tangent and intersecting circles, formed an important element in the elaborate illuminated manuscript designs of this period.

In (*d*) is shown a wall decoration in gold against a buff ground. The design is worked out in the flat with extreme conventionality, still introducing the circle as the unit of repetition. The decoration at (*e*) is a late example in which the hexagon is used as the unit of repetition.

35. Fig. 16 (*c*) shows an example of ceiling decoration from the church of St. George, at Thessalonica. The peculiar outline of the device adjacent to the four sides of the interior rectangle is suggestive of Arabian origin, and is exceedingly ingenious in its method of preserving symmetry and preventing awkward repetition.

In (*b*) is shown an example of wall decoration from the same edifice. The effect is very rich, and the arrangement of the rectangles and smaller circles shows a knowledge of surface division that is well carried into effect. The coloring is Byzantine, and worthy of careful study. Though brilliant, it is never glaring; the hues are selected to harmonize and to produce a soft bloom effect at a distance.

RISE OF THE SARACENS

(622 A. D. TO 755 A. D.)

36. It will now be necessary to turn aside for a moment to consider a remarkable period in history when an Oriental nation invaded Europe and established its customs and religion where another race and another faith had previously existed for several centuries.

Mohammed, a rich merchant much respected in Arabia, was the founder of this new religion. When about 40 years of age he announced that he had been chosen by God to reform the faith and practices of the Arabian nation. He acknowledged both the Jewish and Christian beliefs as sent from God, but claimed that he had received later and more complete inspirations from divine sources, for the benefit of his own people. Thus, he gave his countrymen a religion that united the scattered Arab tribes into one homogeneous nation. His native town of Mecca, however, soon denounced him as an imposter, and he and his followers were obliged to flee for safety on July 15, 622 A. D. This flight, termed "Hegira," is the beginning of the Mohammedan era from which all their dates are reckoned.

Mohammed took refuge at Medina, where he made a number of converts. With increase of followers the religious reformer became a red-handed soldier, and at the end of 10 years, conversion to Mohammedanism had been forced on the whole Arabian peninsula. As the Arabs were about to force this belief on other nations, Mohammed died, in 632 A. D. His successors, however, endeavored to carry out the campaign, and began a long series of wars and invasions, until Mohammedanism was spread over a large part of Asia, Africa, and Southern Europe.

37. The Arabs, or Saracens, as they were called, met with comparatively little resistance in Oriental districts, as

those countries were a part of the Roman Empire in which Christianity and Roman law had taken little hold. Thus, the great Eastern Empire was shorn of all its possessions, and in the far East, all the lands from Persia to India were added to the Moslem Empire.

In the West, however, the Saracens met with stout resistance. Constantinople was besieged for 8 years without result; and 40 years later a similar siege met with failure. In Northern Africa, too, there was great resistance, but finally the whole Northern Coast was subdued, and in 710 A. D. the Mohammedans crossed from Africa into Spain and established themselves at Gibraltar. They then overran the whole peninsula and established a kingdom that lasted 700 years. They crossed the Pyrenees and entered Southern France with the intention of adding that country, and possibly all Europe to their empire, but in this they were unsuccessful. In 732 A. D., near Tours, France, the invaders were met by a powerful Christian army under Charles Martel, and here a fierce battle raged for 7 days. The Saracens were hopelessly defeated, and the progress of Mohammedan arms in Europe was forever checked. Had this not been accomplished the entire history of the world might have been changed. To Charles Martel then we owe the preservation of Europe for the Christian kingdoms and to the descendants of Charles Martel we largely owe the permanent establishment of the Church universal.

This great Saracenic Empire, extending from India to Spain, was for a short time under the rule of a single emperor, or caliph.

38. The influence of this Saracenic invasion was in reality beneficial. During the dark, feudal ages, when all Europe was sunk in the grossest ignorance, the Oriental Saracens were actively engaged in the cultivation of science and art. The libraries and schools at Cordova, in Spain, and at Bagdad, in Persia, gave to Europe all that was original, during the middle ages, of medicine, mathematics, and physics.

These people also developed an architecture of their own that is rich in ornament and decorative effect. This will not be considered, however, until the development of the medieval styles is finished.

REVIEW EXERCISES

1. What was comprised in the Byzantine Empire?

2. What religious influences affected the Byzantine style?

3. When did the Byzantine Empire come into existence?

4. What are the leading characteristics of the Byzantine style?

5. Of what character of buildings do the Byzantine examples consist?

6. (*a*) What is the principal structure in the Byzantine style? (*b*) When was it built?

7. In what way did the Byzantine system of building walls differ from the Roman system?

8. What influences affected the development of Byzantine ornament?

9. Make a drawing in pen and ink of a Byzantine capital.

10. Make a drawing in color of Byzantine running ornament. Drawings should be large enough to show details clearly and must be executed on sheets of white paper 9 inches by 12 inches.

11. (*a*) Who were the Saracens? (*b*) In what way did they affect the history of Europe? (*c*) During what period did they exercise the greatest influence?

ROMANESQUE ARCHITECTURE

(800 A. D. TO 1200 A. D.)

INFLUENCES

39. Geographical.—While the Byzantine art was settling itself into a fixed style in Eastern Europe the Romanesque was developing in the West. As the different countries of Europe began to assume character under individual rulers, the architecture that developed in those countries possessed peculiarities that were purely geographical in character. The Romanesque architecture of Italy was greatly influenced by Byzantine art, and in many cases (as at Venice and Ravenna) it is difficult to distinguish between the Romanesque and the Byzantine. Spain and France being far to the west, however, the style was influenced less by Oriental art, and in England, which is separated entirely from the mainland, it developed quickly into an entirely new style founded on the old architecture of the Romans but developed without any foreign influence.

40. Geological.—Although Romanesque architecture pervaded all of Western Europe from the fall of Rome to the end of the 12th century, one of the strongest characteristics of the style in general is the use of materials that marked its individuality in each particular country.

41. Climatic.—The style of building that would be suitable in sunny Spain would be utterly unsuitable in the foggy climate of England, and, therefore, owing to the immense territory throughout which this style developed, a considerable variation of detail is found, due to climatic conditions.

42. Religious.—Were it not for the civilizing and educating influence of the Church, Romanesque architecture

would not have possessed the unity of feeling necessary for the establishment of one style throughout Europe. The differences in climate, materials, and geographical positions would naturally have produced a variety of styles if there had not pervaded throughout the entire country one general religious motive that prescribed certain details of manners and customs uniform throughout the Christian world. The erection of a church was often the foundation of a city. Monasteries grew to great power until they practically controlled the local civil governments. Science, literature, art, and general intellectuality were not considered to be of any importance to any except the religious orders until after the middle of the 12th century. Students in the monasteries became designers of great cathedrals, and the relation of the monastic institutions to architecture was consequently of great importance. In fact, architecture was practiced almost entirely by the clergy, and was regarded as a sacred science. The monastic orders thus founded and fostered many arts, the products of which are associated with the names of those orders at the present day. The Dominican order was founded in the South of Italy by Saint Benedict, and in its monasteries throughout Europe were taught architecture, painting, mosaic, and all branches of art work. This order of monks controlled all the old monasteries in England, such as Canterbury, Fig. 69, and Westminster Abbey, Fig. 73.

43. The Romans, when they wished to erect great monuments of public utility, could send to the spot, no matter how remote, an army of soldiers, and by their tyrannical system of government compel the inhabitants of the locality to desist from all other employments and work for the emperor of Rome. Thus by a multitude of hands they achieved those prodigious results that today stand monuments to their enterprise and their despotism.

Had the builders of the middle ages desired to pursue this course, they could not have found the army of workmen. In a country without stone, without money to buy it, without beasts of burden to transport it if they could buy it, even

without roads over which to travel, these people could not possibly attempt to follow the course of their Roman neighbors.

For the following reasons, therefore, the religious orders were the first that could by themselves undertake important building:

1. Because they could gather together at one place a number of men (monks) united by a single paramount thought, subject to discipline, freed from military service, and possessors, in the name of the Church, of the land on which they lived.

2. Because the religious orders acquired property and improved it under a regular administration; because they joined in amicable intercourse with neighboring establishments; because they plowed the uncultivated lands, laid out roads, and with the fruits and tolls of their industries bought quarries and woodlands, built workshops, and offered to the peasants guarantees that could be depended on. Thus the church lands were rapidly populated and improved, while those of the laity and nobility were continually devastated by war.

3. Because the religious orders were able to form—with their monasteries, schools of craftsmen, subject to regular apprenticeship, clothed, fed, maintained, and worked under the same directing influence—schools that preserved traditions and recorded improvements.

4. Because the churchmen alone, at that time, extended an influence to a distance by founding remote establishments subject to the mother abbey.

Hence, to the activity of religious orders the art of construction owes its rise from barbarism in the 11th century.

44. Political and Historical.—About the year 800 A. D., the Roman Empire in Western Europe passed entirely from the hands of the descendants of the original Romans by the election of Charlemagne, a Frankish king, as emperor. Charlemagne encouraged the establishment of the monastic communities and thus encouraged building. He restored the

arts, improved civilization, and did much for the general progress of Western Europe.

However, a popular superstition did much to retard the progress of this period. It was generally accepted as a fact that the end of the world would come in the year 1000, and few buildings were erected as the task seemed to be useless. When the dreaded year arrived and passed, however, the superstition was broken, and building activity sprang up everywhere. All the great nations of Europe had by this time come into existence. France, Germany, and Spain were becoming individually powerful. Denmark, Sweden, Norway, and England were distinct kingdoms, and, under individual influences, were developing individual styles. Civilization progressed rapidly and independently in each local section.

45. Feudalism.—Before studying the development of medieval architecture it will be necessary to consider the peculiar system of government that existed throughout Europe during the middle ages. This system was called **feudalism**, and developed from the peculiar relation that existed in the Teutonic tribes between the men and their chiefs. When these tribes overthrew the Roman Empire, 476 A. D., every free Teuton that had served his chief in the conquest received as his share of the spoils a tract of land that became his personal property, or *freehold*. The chief, of course, retained a very large domain for himself and it became customary for him to grant portions of this domain to certain of his favorites and followers on condition that they would serve him in time of war. These grants of land were different from the freeholds, and were called *fiefs*. The person that received them did not own the land, but held it by *feudal tenure* so long as the conditions imposed on him by his chief were fulfilled. The chief, or king, could recall the land at any time he wanted and give it to another if he chose. The person holding the land under feudal tenure was called a *vassal*.

Just as chiefs or kings made feudal grants to their favorites, so some of the smaller Teutonic landowners granted portions

of their land and retained vassals of their own. Bishops and abbots granted extensive tracts to various knights, who thus became vassals of the Church. By the 11th century, all Europe was governed by a system of feudal tenure, and very little land was held in freehold. The great nobles that originally inherited freeholds were glad to return them to the king and receive them back as fiefs, thereby becoming vassals of the king and receiving from him many rich gifts that were in his power to bestow. Thus, all property became a connected system of fiefs, and, from the king down to the poorest freeman, land was held in feudal tenure, and every individual was a vassal to some one a little higher up. Kings themselves became vassals of other kings in the cases of the lands lying beyond the boundaries of their kingdoms. Thus, William the Conqueror, when he became king of England, was, as duke of Normandy, a vassal of the king of France.

46. So far only landholders have been considered, and these were the forefathers of subsequent nobles; the great mass of the people, however, were not freeholders at all, but *serfs*. Serfs were not slaves—they could not be bought and sold—but they were bound to the land and belonged to it, so that when it changed hands from one owner to another, they were bound to change with it. Each fief consisted of two distinct details: the castle, usually located on a hill, where the proprietor, or noble, lived with his family and his soldiers, and the village, or *cité*, which was inhabited by the tillers of the soil. Many of these were free-born men that rented land or served for wages, while others were serfs that were the born servants of the owner of the soil.

Feudalism tended to prevent the growth of the nations. A kingdom consisted of a cluster of principalities under a common head—the king or emperor—but that head lacked power, as no one of the nobles, should he choose to disobey the king, could be forced to fulfil his feudal duties except by means of war. Consequently, the kings were at war with one or more of their vassals nearly all the time.

material on which a religious sentiment or the legend of a saint might be written. The few sparks of ancient learning that survived during these centuries were preserved only through the Church. The monks were taught to read and write, and they spent much of their time in illuminating missals and executing wonderful work with the stylus and brush, so that through the monasteries a slight knowledge of the conditions of this period has been preserved to the present day. That this barbarism and inactivity was due to the lack of books will be evinced later on, and with the invention of printing came the awakening, advancement, and real progress of the world.

The illuminated manuscripts of the Middle Ages are wonderful works of art and skill. They are mostly written in Latin; the body of the text being executed letter by letter with the stylus, and the initials, borders, chapter headings, etc. rendered in gold and color with the stylus and brush, Fig. 16 (*a*). Many of these manuscripts were the work of a lifetime in the monasteries, and no amount of trouble seemed excessive to the devoted monks that had consecrated their life's work to the propagation of their religion.

Illumination did not originate in the monasteries, however, as the art was derived from Greece, and was never lost in Europe until after the invention of printing. None of the early Greek and Roman manuscripts have been preserved, but there are many designs in the Byzantine manuscripts that are evidently copied after them.

Illumination was also practiced by the Arabs, Persians, and other Oriental nations, and many beautiful pages from the Koran exist, that were executed from the 14th to the 18th century.

161 § 50 FIG. 16

CHARACTERISTICS

49. The term *Romanesque* can be said to apply to all architectural constructions in Western Europe that were based on Roman art and theory, and carried out in a rough and primitive way according to the means and material of each individual community. In general character, Romanesque architecture is simple, sober, and dignified; but it is picturesque through the introduction and grouping of towers and the projection of various wings and transepts. A new constructive principle now appears—the principle of equilibrium, or balance, in contrast to the principle of stability, as practiced by the Romans. Where the Roman architect had to withstand the thrust of an arch, he planted an immense quantity of masonry strong enough to withstand it by dead weight; whereas, if a Romanesque architect wished to withstand the thrust of an arch, he arranged for it to receive the thrust of another arch in an opposite direction, thus counteracting the force.

A new material also was now used—dressed, or cut, stone laid together in the body of the wall with beds of mortar. Heretofore, walls had been of concrete and were only veneered, or surfaced, with stone, but now stone was built in as part of the wall, and by this new employment of the material, architecture became a system of construction, and development of this construction henceforth marked the development of a new architectural style. Here, too, is found the column used as a direct support of the building. In Roman architecture, the columns were applied on the faces of concrete piers or supported only an entablature over a porch. The Romanesque architect, however, used columns to support the arches, taking up the thrusts by counterthrusts from other arches.

50. The principle of balanced thrusts is illustrated in Fig. 17. In (*a*) is shown a section through the roof and two side walls of a building. The weight of the roofing material presses downwards on the rafters in the direction

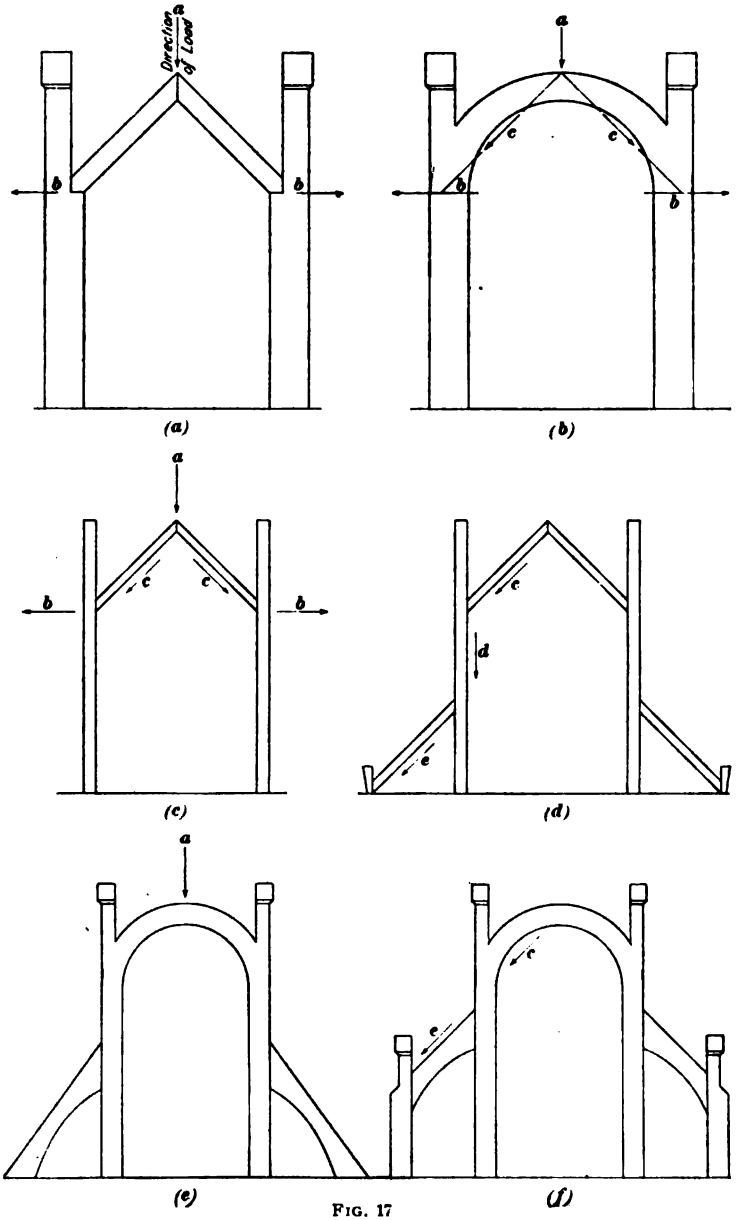


FIG. 17

of the arrow *a*. This pressure tends to depress the rafters and to overturn the side walls in the direction *b*. If, instead of rafters, a masonry arch is turned between the walls as in (*b*), the effect will be the same. The load in the direction *a* will be split and transmitted against the walls in the direction *c*, and unless they are strong and heavy enough to withstand this thrust, they will turn over in the direction *b*. Two upright timbers supporting two rafters, as in (*c*), would immediately fall outwards if a load were imposed at *a*; but this could be obviated by placing props against these timbers and driving stakes into the ground at the foot of the props, as in (*d*). The thrust would then take the direction *c d e*. Now, applying this principle to the condition existing in the stone arch in (*b*), there will result a structure similar to that shown in (*e*), where half arches on each side prop up the main walls under the arch. The development of this principle as completed in (*f*) presents the complete principle of buttresses and flying buttresses in medieval architecture. The *flying buttresses* are the semiarches that prop up the main arch, and the *simple buttresses*, like stakes in the ground, carry the load to the earth. This principle is illustrated in the cathedrals shown in Figs. 66 and 67.

51. Romanesque architecture was distinctively ecclesiastical. Civilization and culture emanated from the Church, and the requirements and discipline of the religious orders gave form to the builders' art. The basilican style of building, which had so well served the purposes of the Church in the earlier centuries, suited the new conditions only so far as its plan was concerned. Corinthian columns, marble incrustations, and splendid mosaics were not to be obtained in the forest lands of Northern and Western Europe, and the priests and monks endeavored to erect, with unskilled labor, churches of stone and as far as possible of a fireproof construction in which the general arrangement of the basilica plan should be maintained. The struggle with this problem underlies the entire system of

Romanesque design, while the solution of the problem characterizes the development of the Gothic style.

52. However rich and powerful the monks might be, compared with the feudal lords and barons, they could not hope to build as the Romans did. They endeavored to erect solid and durable structures, but practiced the closest economy, owing to the scarcity of materials and men.

To follow the Roman method of making their structures a mass of rubble between two faces of ashlar or brick, demanded more laborers than they had at their disposal. To build of enormous blocks of hewn stone, carefully cut and set, as the Greeks did, required means of transportation far beyond their facilities. So they pursued a middle course. For the principal points of support, they used cut stone as a casing and filled in with rubble, and for other walls, a thin facing of ashlar enclosing a concrete filling made of pebbles and mortar.

The Roman buildings, by reason of the absolute stability of the different points of support and the perfect concretion, or solidifying, of all the upper parts, presented immovable masses, as if they had been cut out of a single block. The Romanesque builders soon realized that their buildings presented no such stable conditions. The piers, which were formed only with a veneering of solid stone and put together with a poor quality of mortar, and the walls, which were unbonded throughout their height, suffered from unequal settlement, causing ruptures, and, consequently, serious accidents. These errors were not repeated, however, and the endeavor to avoid them resulted in a new development.

53. Romanesque Vaulting.—In order to comprehend the development of architecture from this period to the end of the Gothic period, the system and development of vaulting should be clearly understood.

Toward the beginning of the 11th century the Romanesque architects attempted to *vault* their structures. They had inherited a knowledge of the value of the Roman vault, but were unable to use it owing to the lack of sufficiently

powerful walls in the structures they had built. The Roman vault will sustain itself only when its supports are solid and immovable; for it is formed of a homogeneous crust of concrete, which, lacking elasticity, breaks to pieces if small crevices appear in its curve. Unable to furnish sufficiently stable walls to support vaults as the Romans did, the medieval builders invented new methods of holding them firmly. The earliest of these attempts ended in failure, but from the very beginning, a new system of building is apparent, founded on the principle of *elasticity*, in contrast to the principle of *stability*, or rigidity, practiced by the Romans. The typical Roman vault, Fig. 18 (*a*), is built of rough-stone concrete, and though sometimes strengthened by

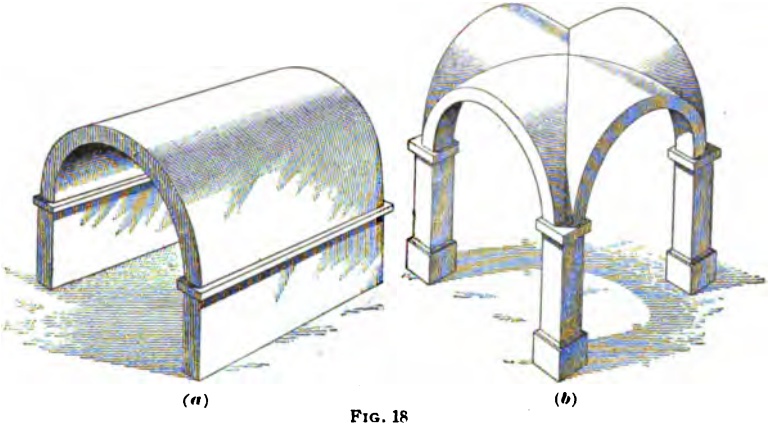


FIG. 18

arches of brick, these arches are buried in the concrete and thereby become a part of the homogeneous mass. In contrast to this method, the Romanesque builders constructed their vaults of hewn stone laid in mortar, following the form of the Roman cradle vault shown at (*a*).

54. The medieval craftsmen at this time knew nothing of the laws of statics, and the thrust exercised by the arch on the side walls being something entirely new to them, they neglected to provide sufficient means to withstand it. Consequently, at the end of the 11th century, many churches

and halls that had been built and vaulted for a period of only 50 years fell in ruins from the collapse of their walls, due to the thrust of their vaults. These accidents, though unfortunate, bore good fruit; they were a lesson to the builders, and showed that other means had to be provided to accomplish the desired end. These same builders knew that a groined vault, such as is shown in Fig. 18 (*b*), exercised its pressure and thrust only at the four supports, and, recognizing the advantage of the groined vault, they tried to replace the cradle vault with it and thereby bring all the weight on piers, which they hoped to be able to render stable. But new difficulties immediately arose. The Roman groined vault can be built only over a square space, and it was necessary to invent a combination of groined vaults adapted to an oblong space.

55. The building of a Roman groined vault requires four semicircular centers, or templets, one for each end of the intersecting vaults, and also two diagonal centers, the curve of which is not a semicircle, like the other four, but an ellipse, as shown in Fig. 19, in which the two front ends of the vaults are removed to show the line of intersection, or *groin*, and the elliptical profile for the center *e o e*.

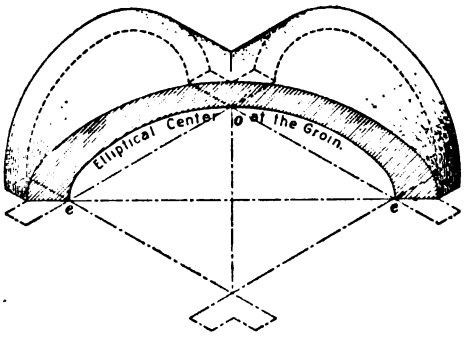


Fig. 19

The Romanesque builders did not comprehend the curve of the ellipse, and, having described a semicircle in order to cut out timber centers of the four arches generating the vault, they described a second semicircle on the diagonal as a diameter in order to cut out the two diagonal centers. Thus, the crown *o*, Fig. 20, where these two vaults intersected, was on a higher level than the crowns *a* and *b* in the

generating arches, and the vault, instead of being the result of the intersection of two semicylinders, was a nameless compound of curved surfaces, slightly resembling a dome.

On this principle is based the whole system of vaulting during the middle ages. This principle is important on account of the fact that, though they were trying to use the Roman vault, they modified it to such an extent that it became a different device entirely, and the builders of the middle ages were thus suddenly emancipated from all the bad influences of the Roman style, and left free to develop a new style from the raw material they had at hand, in the same manner that the Byzantine builders developed an original style, by careful study of the structural principles of the dome.

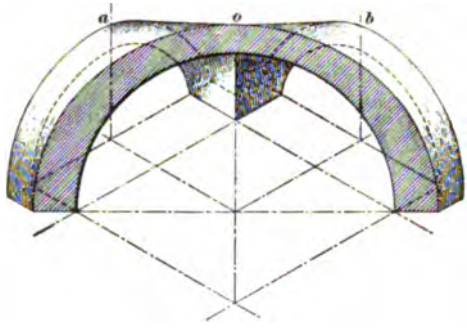


FIG. 20

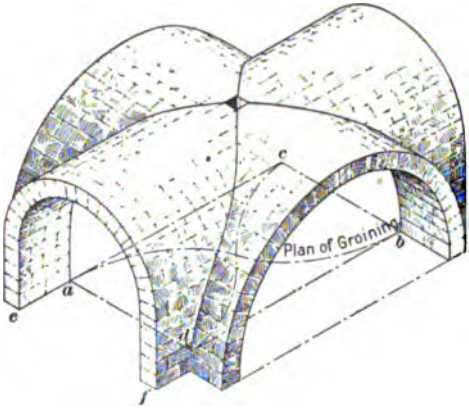


FIG. 21

56. Having modified the Roman vault in this way, the next problem was to apply it to oblong plans, for the builders had already realized the danger of applying cradle vaults to wide spans. The Roman groined vault, applied to oblong spans with a wide intersection, required the arch over the narrow span to be *stilted*, as shown at *e f*, Fig. 21, and the lines of the groins *a b*

and *c d* were not straight, but formed the compound curves *a b* and *c d*. This was a still more complicated problem for the Romanesque builders, but they solved it in the same manner as before, by cutting the centers, both for the ends and for the intersections of their vaults, in the form of a semicircle. But with this simple solution another difficulty arose. The lines of intersection, or groins, in the Romanesque vault were forced by circumstances to be straight in plan, as they were built over semicircular centers; but this produced such a warped surface in the vault covering itself that the groins were *projecting* at the springing point and *indented* at the crown.

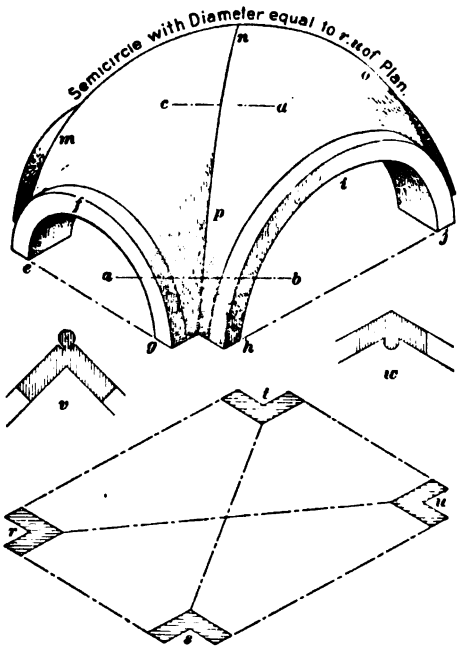


Fig. 22

Fig. 22 shows an exaggerated form of the Romanesque groined vault with the arch *e f g* over the end *r s* of the oblong space *r s u t*, and the arch *h i j* over the side *s u*. The intersecting curves *m n o* and *p n* over the diagonals *r u* and *s t* are semicircles, but the groins inside the vault do not produce a continuous angle on which a bead can be worked, as is the case when the arches are two intersecting cylinders of the same diameter. A section through the corner on the line *a b*, would produce an exterior angle, as shown at *v*, with the bead worked on the corner, but in following the groin up into the vault, the angle becomes more and more obtuse until it reverses itself and at *c d* becomes an interior

angle, as shown at *w*. This was very unsightly, and the builders immediately set to work to improve on it.

57. It was at this time that the pointed arch made its appearance, and there is little doubt that its invention or adoption was the direct outcome of the difficulties in groined work just cited.

In Fig. 23 is shown a pointed groined vault with the groins built on semicircular centers *c d e* that are higher at their middle points *o* than the crowns of the pointed arches *a* and *b*. The crown of the vault is therefore curved in the same manner, though not so much as the crown of the vault shown in Fig. 21; but the groins in the pointed vault are perfectly straight throughout their length and can be worked or beaded as desired. As said before, the method of building these arches was not that of the Romans—a solid concrete mass with brick arches embedded in the concrete to give it strength while it was setting—but, on the contrary, the late Romanesque vault was composed of small panels, or slabs, laid on the ribs, or groins, for support. At each end of the vault a pointed arch was formed, and at the intersection, or groin, a semicircular arch was turned, as shown in Fig. 23; on these arches boards were laid, and the masonwork of the vault was then built over the boards, the arches remaining in place and thereby forming a sort of permanent center.

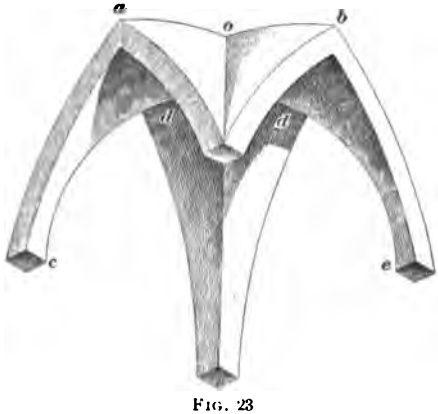


FIG. 23

58. Fig. 24 illustrates the constructive system of the late Romanesque or early Gothic church, the transition from one style to the other being so gradual that an exact line of

distinction cannot be drawn. The walls *a* of the nave are supported on the columns *b*, and the roof over the nave is vaulted in the Gothic system just explained. The groins, or ribs, of these nave vaults rest on the piers *c*, which are directly over the columns *b*, and the thrust of the nave vaults is carried by the flying buttresses *d* across the aisle vaults *e* to the solid buttresses *f*, the lower portion of which also receives the thrusts from the aisle vaults at *g*, thus illustra-

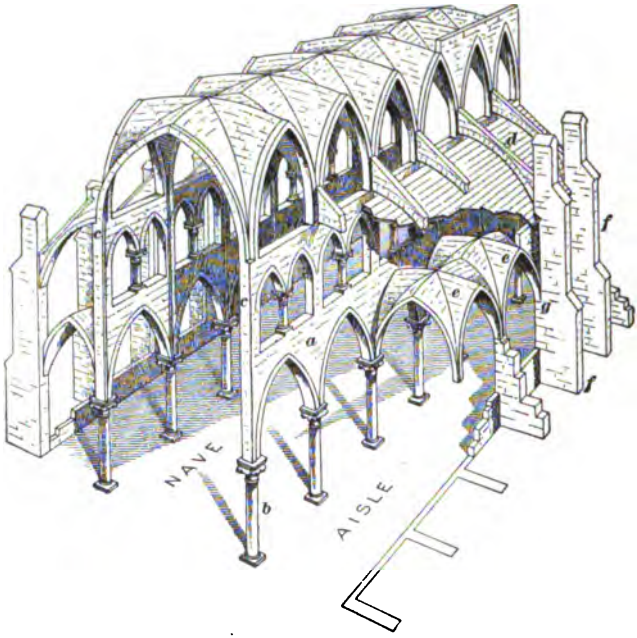


FIG. 24

ting the two great principles of Gothic construction: concentration of load on isolated supports, and balanced thrusts. The former of these principles was made possible by the use of the groined vault instead of the barrel vault, as the former required supports only where the groins rested and the structural details of the church became simply a stone roof, supported on masonry stilts and filled in between with thin screen walls, as shown in Fig. 24.

59. The second of these Gothic principles of construction is in direct opposition to the Roman system of vaulting, where the thrust of the vault was resisted entirely by the inertia of a mass of masonry piled against it in the abutments. In late Romanesque and Gothic architecture the thrusts of one vault were counteracted or balanced by the thrusts of adjacent vaults and the accumulated strains then transmitted by means of *props*, or flying buttresses, to heavy fixed buttresses located at convenient points. This system of construction reached its greatest development in French cathedrals during the XIII and XIV centuries.

ANALYTICAL STUDY

PLANS

60. Charlemagne adopted the plan of the Roman basilica as a model for his new churches, and, with the assistance of artists and skilled workmen to carry out his ideas, erected them in the Roman style. Transepts were added to the basilica until the church become crucial in form, and a chancel for the clergy was screened off and prolonged on the east end. Generally speaking, the transepts were the same width as the nave, and the nave was twice the width of the aisles. The choir was raised on a series of steps, under which was usually established a crypt, to receive the dead bodies of prominent persons. Many of the older churches had cloisters in connection with them. These consisted of a vaulted passageway extending around a court or leading from the chapter house to the church. The cloisters were designed with great care and possessed decorative details of great beauty. The introduction of the tower, or spire, where the transept crossed the nave, added greatly to the beauty of some of these structures, and gave importance to this part of the plan which was termed the *crossing*. Although many adjuncts were introduced into the Romanesque plans, they still retained in the majority of examples the fundamental arrangement of the Roman basilican.

WALLS

61. While the Roman system influenced all construction work in Europe, it had materially declined in character before the fall of the Empire, and technical skill being particularly scarce during the early Romanesque period, the masonry was carried out with extreme crudeness.

ROOFS

62. In the 11th century, vaulting was introduced over the side aisles for the purpose of fireproofing. But the nave was still covered with a roof of wood. The earliest examples of vaulting appear as plain intersecting barrel vaults without any rib moldings, as in Fig. 18 (*b*), but simple ribs were introduced about 1100 A. D., and afterward molded ribs appeared.

Thus the Roman style of vaulting existed throughout Europe until the beginning of the 12th century, when a framework of groined ribs was used to support vaulted surfaces of thinner stone, usually termed *in-filling*. By the latter method the vault was designed according to the profile of the rib, instead of designing the rib to conform to the profile line of the intersection of the vaults. In the Romanesque method, the vault surfaces were governed entirely by the form of the rib set for their intersections, whereas in the Roman method the form of the vault surfaces was determined first and the groins were left to come out in their own geometrical form. The Romanesque architects worked out problems the fixed data for which were the profiles of the intersecting ribs; the Roman architects let these ribs take care of themselves.

The inability of the Romanesque architect to lay out an ellipse of the proper height and span lead to various systems in different parts of the country. In Germany and France, vaulting ribs were usually portions of circular curves, which gave the intersecting vaults a domical aspect. In England, the ridges of the vaults were maintained on the

same level, and a difference in height between the diagonal rib as a semicircle and that of the profile of the intersecting vaults was taken by *stilting* the latter. In cases where a large compartment and a small one intersected, the line of intersection of the two vaults presented a very unsatisfactory and wavy contour. In some Romanesque churches, as at Worms in Germany, Notre Dame at Paris, and Canterbury in England, the difficulty of spanning oblong compartments was overcome by uniting two under one vault. In this manner each pair of side compartments was made to correspond in width with the main compartment in which they were vaulted, as shown in Fig. 54 (*b*), where the main bays are formed to include two smaller bays at the end of the aisle including the windows. In other cases, the intermediate support was carried up and split into three ribs, thus dividing the vaulting into six triangles in the plan, as shown in Fig. 56 (*c*), where *a b* and *c d* are the ribs of the main vault and *e f* is the transverse rib between the aisle vaults. The plan therefore shows six triangles with *a e*, *e c*, *c b*, etc. as their bases, and their vertices at the point where *a b* and *c d* intersect. Such vaulting was known as *sexpartite vaulting*, and the weight of the vaults was supported on alternate piers.

From this time forward, the principle of rib design dominates the style of the vault, and becomes more and more complex, characterizing the several periods of the Gothic style. It will be observed hereafter that the difficulty of accommodating different heights of arches in the intersections of diagonal ribs was entirely overcome by the introduction of the pointed arch.

COLUMNS

63. Flutings, both vertical and spiral, and naturalistic carvings on the shaft are characteristic of the Romanesque period. At first there was undoubtedly a strong influence exerted by the Ionic and Corinthian capitals, but the characteristic Romanesque style developed itself later.

OPENINGS

64. One of the strongest characteristics of the Romanesque style is found in the door and window openings. The jamb around the door was formed in receding planes, or *orders*, as they were termed, in each of which was inserted a small circular column. The arch over these columns was built in concentric circles [see Fig. 49 (*c*)]. Circular windows over the principal doorways were also common at this time and the principal doorway generally entered one of the transepts.

MOLDINGS

65. Generally speaking, Romanesque moldings consisted of the ornamentation of the projecting stone courses, with chamfers, rounds, and rough-carved ornamentation. At first these were hewn out with the stone ax, but afterwards they were more finely cut with the chisel. On bases of columns, a form of the old classic base was used over a square plinth, with carved leaves to fill up the projecting triangles at the corners, or with the lower torus molding overhanging the plinth.

ORNAMENT

66. All decorative design was derived from vegetable and animal elements, and was very rudely carved and very conventionally treated. Fresco is more frequently found on the walls than mosaic, owing to the lack of skilful artists, and the designs in stained-glass windows show the influence of the Byzantine character.

These are the general characteristics of Romanesque architecture throughout Europe. Individual characteristics will be discussed under the separate countries.

Romanesque architecture does not present that brilliancy of decorative effect that characterizes the Byzantine. As has been explained heretofore, marble columns and elaborate mosaics were unattainable by the Romanesque workers, while the wealth of Byzantium rendered such luxuries a

characteristic of the Byzantine style. The Romanesque builder therefore decorated his walls with carving and fresco work which he could execute himself, while the Byzantine imported talent from Italy, Greece, and the Orient.

REVIEW EXERCISES

1. When and in what countries did Romanesque architecture flourish?

2. In what way did religion affect the architecture of the Romanesque period?

3. In what way did the Romanesque system of building differ from the Roman system?

4. Why was there but little building before the 11th century?

5. (*a*) What system of government existed throughout Europe during the Middle Ages? (*b*) Describe it briefly.

6. Of what did chivalry consist?

7. What were the Dark Ages?

8. To what does the term Romanesque architecture apply?

9. What is the essential difference between the Roman system and the Romanesque system of vaulting?

10. Give the general characteristics of Romanesque: (*a*) plans, (*b*) openings, (*c*) roofs.

ITALIAN ROMANESQUE

INFLUENCES

67. Geographical.—In Italy there were different influences at work that materially affected the architecture in different sections. The central portion, as shown on the map, Fig. 25, including Rome, extends from Florence and Pisa on the north to Naples on the south. Pisa and Naples were maritime cities and commanded a large Mediterranean trade, while Florence was inland, on the road to the north, and commanded the passage of the Arno River. This central section being nearest Rome, its architecture was greatly influenced by the classic monuments.

Northern Italy, extending from Florence to the Alps and Tyrolean Mountains, contained the city of Milan, which always enjoyed a prosperous trade owing to its proximity to the Alpine passes and its position in the center of the state of Lombardy, of which it was the capital. On the east coast are the cities of Ravenna and Venice, both of which had extensive trade with Byzantium, as has heretofore been pointed out. The Romanesque of Northern Italy was therefore influenced by the architecture of both Northern Europe and the Orient.

Southern Italy, including Sicily, being situated practically in the center of the Mediterranean Sea, had for years been under the influence of both Northern Africa and Greece. Sicily had belonged to each of these countries before it became a part of Italy. The architecture of Southern Italy therefore shows the influence of these foreign countries.

68. Geological.—Building materials abounded in great variety in Central Italy. Near Rome, brick, volcanic stones, and travertin were used, the latter being imported from

Tivoli. Marble was imported from Pharos, Carrara, and other Greek islands. In Northern Italy, brick was the principal building material obtainable. In Southern Italy, the mountains afforded an abundance of limestone.

FIG. 25

69. Climatic.—In Central Italy, the climate is warm and agreeable, but in Northern Italy it varies from extreme cold to excessive heat, similar to the climate of Central Europe. Milan is near enough to the mountains to experience very cold winters, while its summers are almost tropical. Southern Italy enjoys a tropical climate. Palm,

lemon, and orange groves flourish the year round, and on the southern coast the climate renders many Oriental customs characteristic.

70. Religious, Political, and Historical.—In Italy are found the first great influences of the Church in the administration of the government. The popes at Rome had thus far only small, landed estates of their own, but their relations with the kings of the newly established countries gave rise to numerous disputes. Therefore, the history of the papacy is closely interwoven with the development of civilization from this time on. Until the overthrow of the Western Empire, this part of the world was practically in a chaotic condition. The Church alone was able to preserve organization of society, and therefore became a great moral power.

By the middle of the 8th century, the Lombards had established a powerful kingdom in Northern Italy and began to encroach on the possessions of Rome in Central Italy. Pope Stephen II then asked Pepin, who was king of the Franks (a Christianized Gothic nation that inhabited nearly all the country now known as France and Germany), to help defend Rome against the Lombards. Pepin responded to the pope's request by defeating the Lombards, winning from them the territory of Ravenna and other lands, which he immediately turned over to the pope. Stephen II accepted this in the name of St. Peter, and thus was established the temporal power of the Church.

71. On the death of Pepin, his empire was inherited by his son Charles, one of the greatest men of the middle ages, and known in history as Charlemagne, a French combination meaning Charles the Great. Charlemagne invaded Italy in 773 A. D. and the Lombards were again defeated. He then united Lombardy to the kingdom of the Franks and confirmed the gifts of his father, Pepin, to the pope. At the end of the 8th century, Charlemagne entered Rome and was crowned emperor of the West by the pope. Charlemagne fell heir to the kingdom of the Franks, and at the age of 60 he was

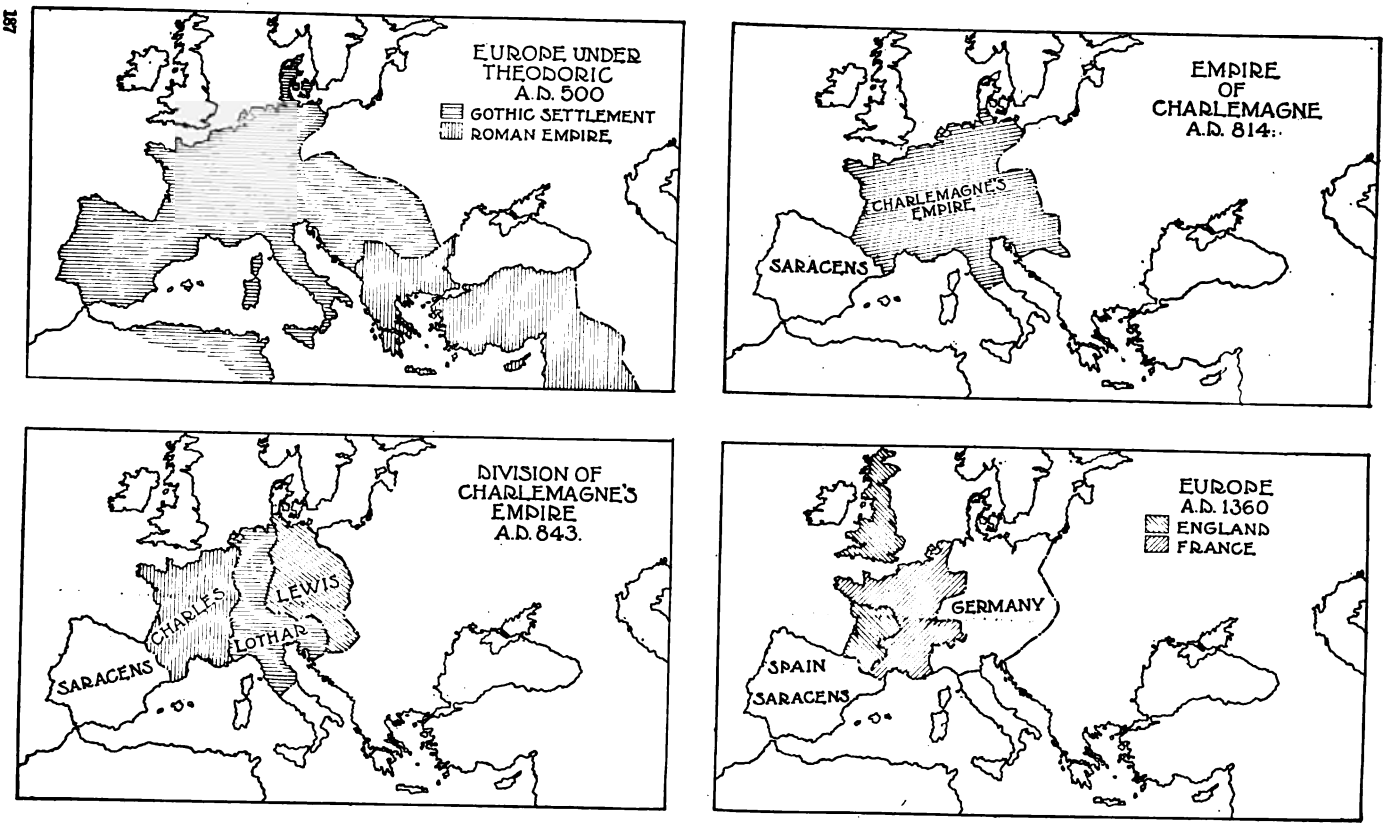

EUROPE UNDER THEODORIC A.D. 500
GOTHIC SETTLEMENT
ROMAN EMPIRE
EMPIRE OF CHARLEMAGNE A.D. 814.
CHARLEMAGNE'S EMPIRE
SARACENS
DIVISION OF CHARLEMAGNE'S EMPIRE A.D. 843.
CHARLES
LEWIS
LOTHAR
SARACENS
EUROPE A.D. 1360
ENGLAND
FRANCE
GERMANY
SPAIN
SARACENS

FIG. 26

monarch of an empire practically as large as that of ancient Rome (see Fig. 26).

Charlemagne was succeeded by his son Louis, a weak monarch, under whom the empire rapidly fell apart. Disputes arose, and Louis turned the reins of government over to his three sons, Lewis, Lothar, and Charles. These rulers quarreled among themselves, until finally, in 843 A. D., the empire was divided among them, and the history of France, Germany, and Italy as separate states began (see Fig. 26).

During all this confusion, the pope at Rome endeavored to exercise his authority in political matters, and thus instituted a struggle between the kings and the popes that lasted many bitter years.

In the meantime, Southern Italy had come under the influence of the Saracens, who had landed in Sicily in 827 A. D. and gradually overran the whole island. For a century, the Saracens held full power, but they finally quarreled among themselves and lost the island to France.

CENTRAL ITALIAN ROMANESQUE

CHARACTERISTICS

72. In Central Italy, the general type of the basilica was maintained, owing to the proximity of Roman models. New ideas of any form were few, and no tendency toward a new style seemed apparent.

EXAMPLES

73. Cathedral at Pisa.—The cathedral at Pisa, Fig. 27, is a characteristic building of this period. Small, external, superimposed arcades produce a fine effect, as does also the treatment of the walls with blind, or false, arcades, in red and white marble. The interior columns support a flat ceiling, suggesting the basilican church.

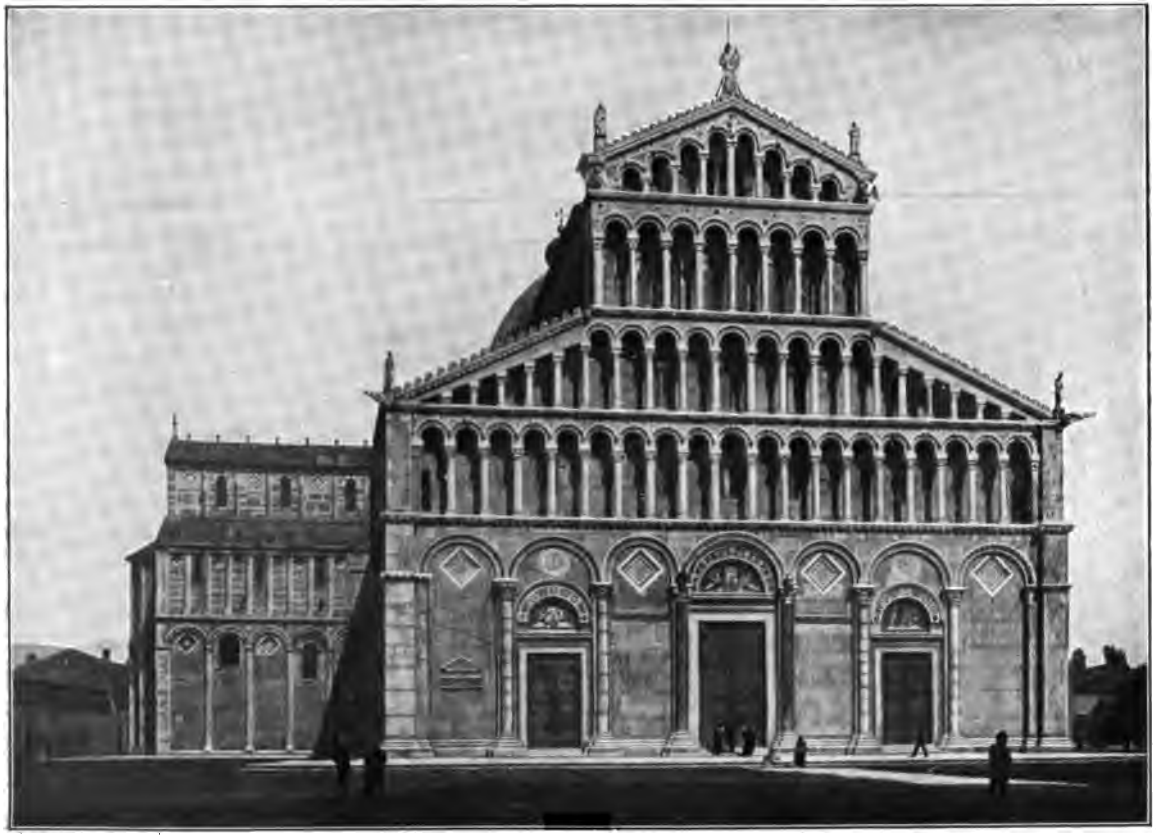


FIG. 27

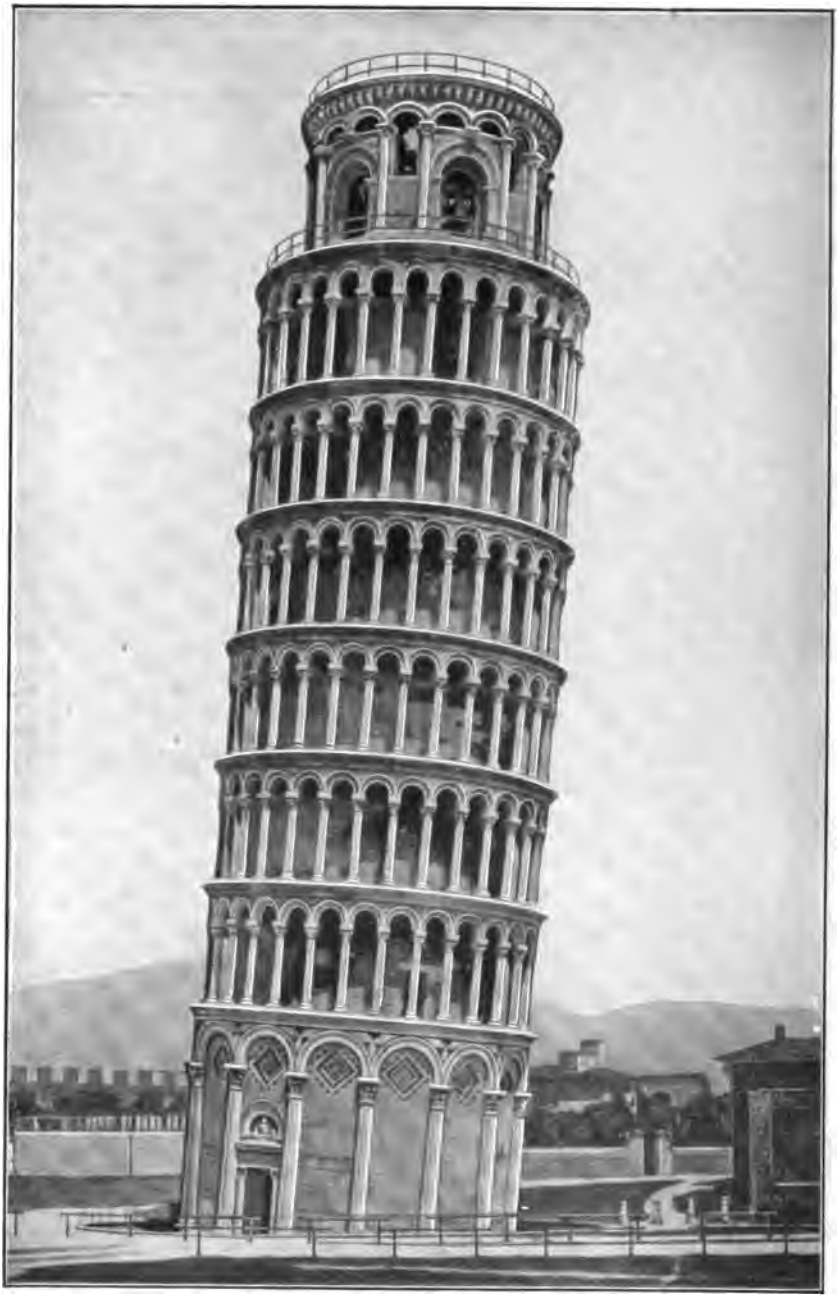


FIG. 28

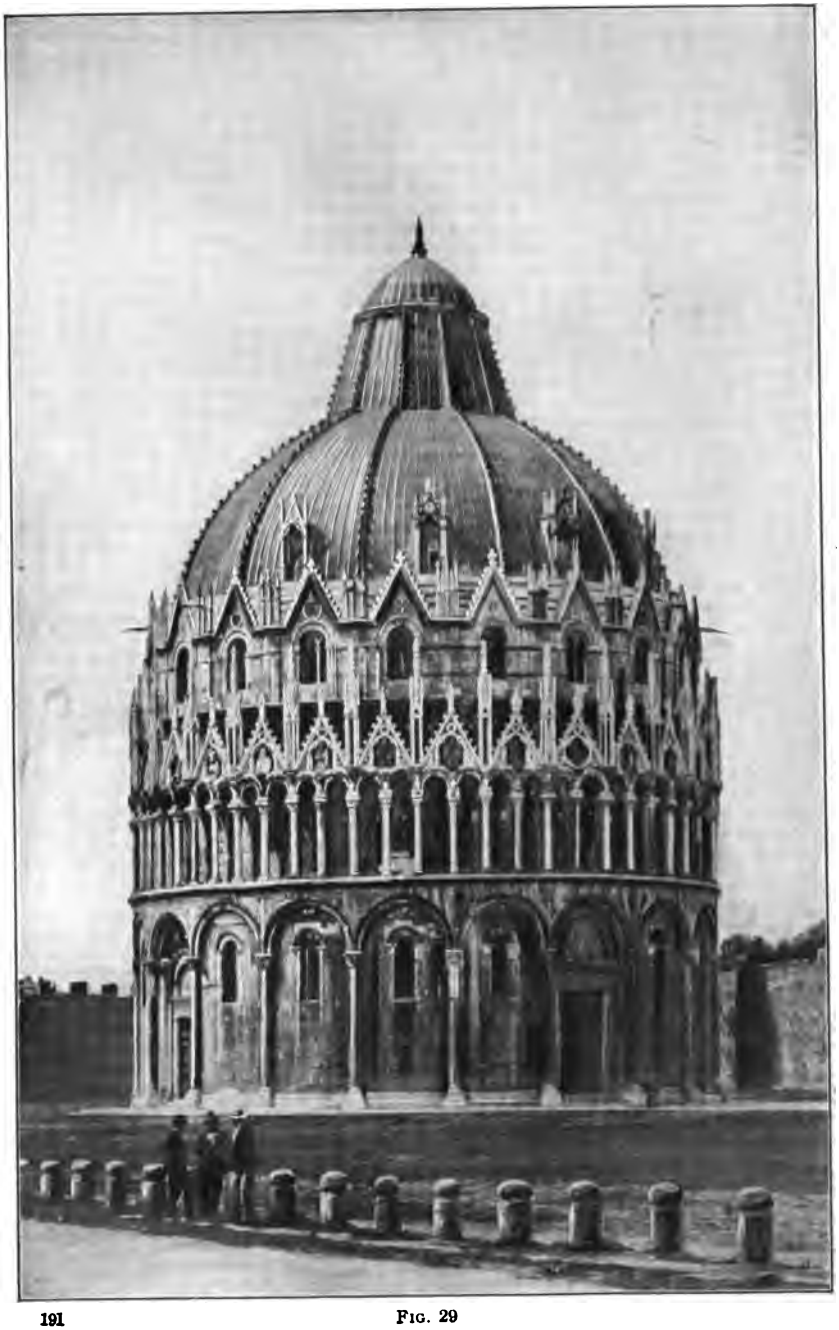


Fig. 29

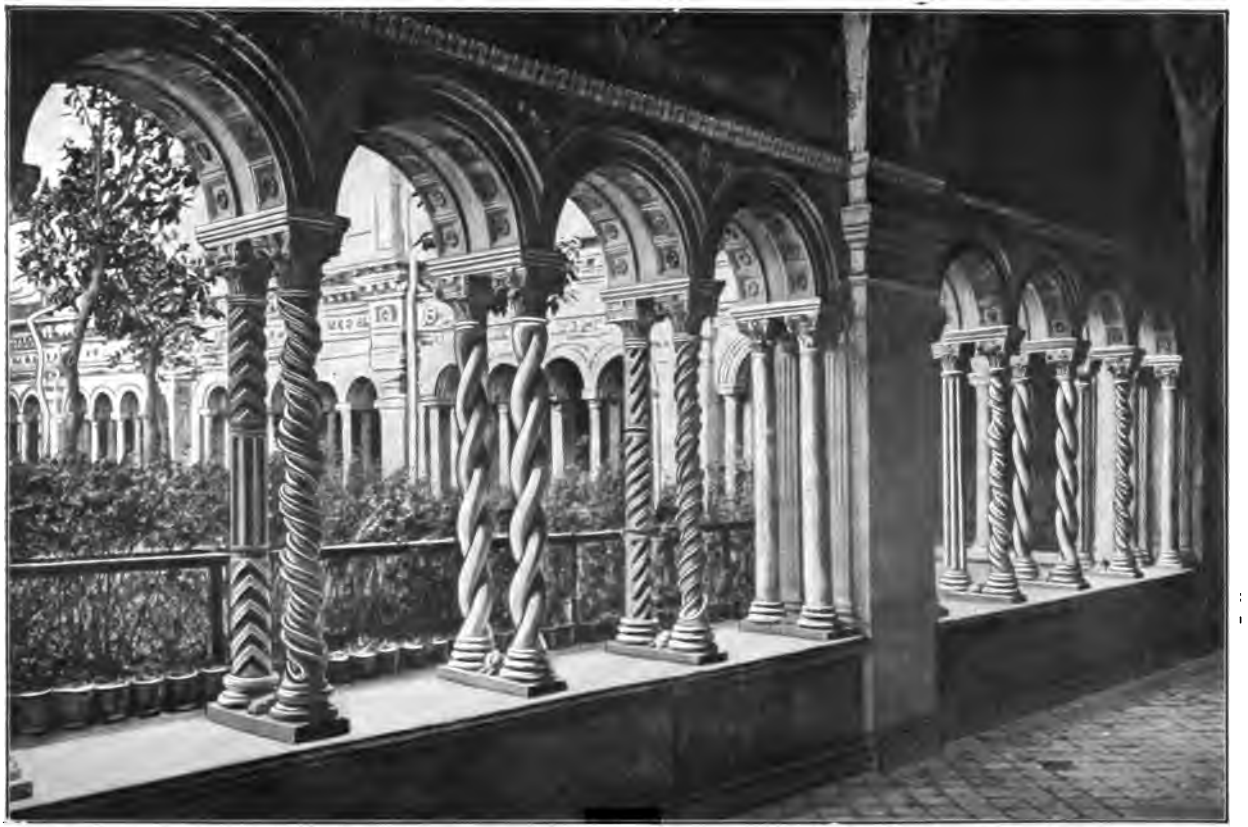


FIG. 30

74. Leaning Tower at Pisa.—The leaning tower, Fig. 28, located at Pisa, is also characteristic of the Central Italian style of Romanesque, particularly in the arrangement of its superimposed arcades.

75. Baptistery at Pisa.—The baptistery at Pisa, Fig. 29, is built of marble, and on the first story is surrounded by half columns connected by an encircling arcade. There are many later additions that give this structure a Gothic character, so that above the first story it should not be classed in the Romanesque style.

76. Cloisters of St. Paul's.—The cloisters of St. Paul's Church at Rome, Fig. 30, are of more than ordinary interest. They are vaulted over square bays and arcaded in groups of four or five openings. The columns are wonderful exhibits of the craftsman's skill, being designed as twisted shafts and inlaid with glass mosaics in beautiful and intricate patterns.

NORTHERN ITALIAN ROMANESQUE

CHARACTERISTICS

77. In Northern Italy, the arcades that decorate the exteriors are restricted to the gables and minor details, instead of being carried through several stories as in Central Italy. The façades are wide and unbroken by any details to mark the nave and the aisles characteristically. The main entrance is sometimes protected by a porch whose columns rest on carved lions, and over this porch a circular window lights the nave. Stone and brick being the principal materials, the exteriors are less elegant than the marble façades of Central Italy. The carved details show scenes taken from the hunt and other pastimes characteristic of the northern invaders, and the grotesque element is prominent, being a decided digression from classic influences.

The churches are mostly of the basilican type and are generally vaulted and roofed. The aisles are frequently

FIG. 31

two stories in height, omitting the clearstory in the nave. Chapels are built along the side aisles, the walls that separate them serving as interior buttresses.

The campaniles, or bell towers, which were not attached to the buildings, but set at a distance or connected by cloisters, are also characteristic of the style in this section of the country.

EXAMPLE

78. Church of San Michele.—The church of San Michele, at Pavia, Fig. 31, shows the characteristic Northern Italy façade with the colonnade along the gable.

The façade is simple and constructed of irregular-sided stone laid with wide joints. Carved ornament frames the portals, which are deep and splay outwards from the doorway to the face of the walls. Over each portal a figure is carved, and horizontal bands of ornament are arranged in the courses of the lower part of the front. The plan is vaulted in square bays, and slightly projecting buttresses mark the width of the nave on the façade. There are no projecting side buttresses on the exterior, but buttresses to receive the vault thrusts exist on the interior, and form dividing lines between the chapels.

SOUTHERN ITALIAN ROMANESQUE

79. The influence of Oriental art—both Byzantine and Mohammedan—is observable in all the South Italy constructions. The cathedral of Monreale, near Palermo, Fig. 32, is a characteristic example. The plan is typically basilican, but the columns of the nave support Byzantine capitals. Rich-colored mosaics adorn the walls and are surrounded by arabesques of Mohammedan origin. The columns of the cloisters, shown in Fig. 33, are richly worked in mosaics and carved relief, the designs varying in alternate groups, with an indiscriminate intermixture of Byzantine and Mohammedan detail. This is also evident in the interlaced borders around the door shown in Fig. 34.

FIG. 32

FIG. 33

FIG. 34

ANALYTICAL STUDY

80. The plans in the Italian Romanesque style were mostly on the basilican order, with the choir raised to permit a crypt below. Circular examples exist, as baptistries.

The walls were pierced by open arcades in a single course of arches in the north of Italy, but by a series of several galleries in the central part. Projecting porches resting on carved lions mark the entrances in Northern Italy, while circular windows light the nave.

The openings were small, particularly in the central and southern portions, where the light is strong and the heat excessive. Blind arches of colored materials were designed in the walls, to overcome the absence of window details.

The roofs were either vaulted or timbered, as in the basilicas of Rome, and where the timber work was exposed, great decorative detail was applied.

The columns were built up as square piers with half shafts attached, especially in the north, where vaulting was more generally practiced, and the buttresses existed almost entirely on the interior of the buildings as separating partitions for the numerous side chapels.

The ornament consisted of crude, grotesque designs representing men and animals, varying in subjects from hunting scenes in the northern examples to apostolic processions and symbols in Central Italy. Southern ornament is characterized by decorative bronze doors, as at Monreale, Fig. 34, and geometrical mosaics and carved running ornament of Mohammedan and Byzantine origin. Colored-glass windows formed no characteristic part of Italian Romanesque, owing to the smallness of the openings. Northern and Southern Italy were strongly opposed to each other in decorative subjects, owing to the different geographical influences. Southern Italy, being nearer to the Byzantine and Mohammedan countries, absorbed decorative ideas from these neighbors, while Northern Italy, being close to the hunting tribes of the mountains, introduced the hunt as a theme for their decorations.

FRENCH ROMANESQUE

INFLUENCES

81. Geographical.—France lies between Rome and Northwest Europe, and during the greatest days of the

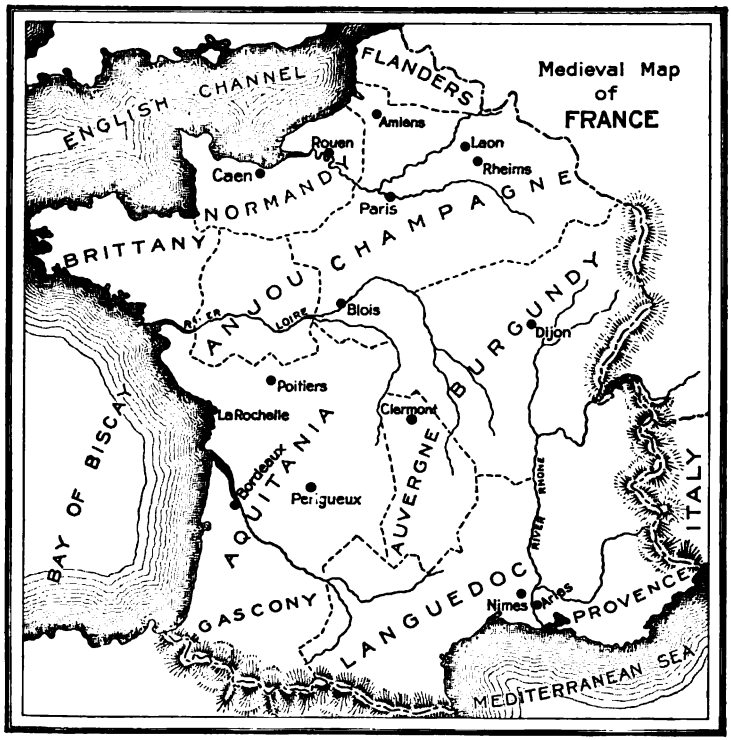


FIG. 35

Roman Empire, it was by way of Provence and the river Rhone that civilization spread to the north (see Fig. 35).

82. Geological.—Stone is abundant throughout France, and consequently most of the structures in that country are built of this material. The soft, fine stone of Caen was not only used throughout Normandy, but was shipped across the English Channel in later years and influenced the architecture in England. In Auvergne, a volcanic material found in the mountains was used in some constructions, giving a soft-colored bloom to the buildings.

83. Climatic.—The climate of France varies from a tropical condition on the Mediterranean to a cold and foggy atmosphere on the English Channel. It is warm on the west coast, owing to the fact that the Gulf Stream closely approaches the shore.

84. Religious.—Christianity, when it spread through France, took a firm hold in the Rhone Valley. In this district, the Cistercian monks enacted severe rules as to the character of church buildings that materially affected the local style.

85. Political and Historical.—Up to the end of the 10th century, the greater part of France had been held by independent lords and nobles. In 927 A. D., Hugh Capet, one of these lords, elected himself king, united the provinces into a feudal monarchy, and selected Paris as his capital. This was the beginning of France. As the king could exercise little authority beyond his capital, lawlessness was rife throughout the country, and architecture made little or no progress until a more settled state of affairs set in. During the weak reigns of the descendants of Charlemagne, Northern France was invaded by the *Northmen*, a tribe from Northern Europe under their leader Rollo, who settled and gave name to Normandy.

In 1066, the Normans, under William, a descendant of Rollo, crossed the Channel and conquered England. William ruled as king of England and retained Normandy as a province—a circumstance that subsequently gave rise to frequent wars between England and France.

CHARACTERISTICS

86. In Southern France is found an adaptation of Roman features without any servile copying of individual forms. Vast interiors enclosed by massive walls seem to have had their origin in the Roman *thermæ*, or baths, rather than in the basilican plan; and the Byzantine system of construction, without its elaborate decorative effect, can be seen in Gascony.

In the north, the style shows the first steps in the coming change to the Gothic system of construction. The interiors were very impressive, great loftiness of the naves being a strong characteristic, and the vaults were ponderous, being supported on massive piers. In the valley of the river Loire, vaulting made rapid progress in constructive ingenuity, but the system practiced in the north differed from that in the south. In the south, the nave was covered by barrel vaults, after the Roman fashion, but the thrust was resisted by half vaults two stories in height extending over the aisles. In the north, groined vaults were built over a square compartment, in the nave, executed in sexpartite vaulting, the ribs or groins of which were constructed independently of heavy stone and the infilling inserted afterwards.

87. As there are peculiarities traceable to the local conditions in both Northern and Southern France, the country must be considered in two sections, the river Loire conveniently forming the dividing line.

Along the Rhone Valley, which had been originally settled by the Romans, is found the strongest classic influences, as at Nimes and Arles.

Southern France can be divided into five provinces: Aquitania, Auvergne, Provence, Anjou, and Burgundy (Gascony and Languedoc were originally included with these). In Northern France are Paris and its environs (Champagne, Flanders, etc.) and the provinces of Normandy and Brittany.

In Aquitania are found two systems of construction, one with round, arched, tunnel vaults, of Roman origin, and the

FIG. 36

other with spheroidal domes supported on pointed arches, indicating Byzantine influences.

The churches of St. Croix and Notre Dame, Figs. 39 and 40, are of the former, while the church of St. Front, at Perigueux, Fig. 36, is of the latter class. St. Front was the prototype of domed churches in France.

Auvergne being a volcanic district, the principal local characteristics are due to the use of various colored lavas as building material.

Provence has today many examples of the 11th- and 12th-century architecture, showing classic influences in the vaulting.

Anjou examples are rich in decorative treatment.

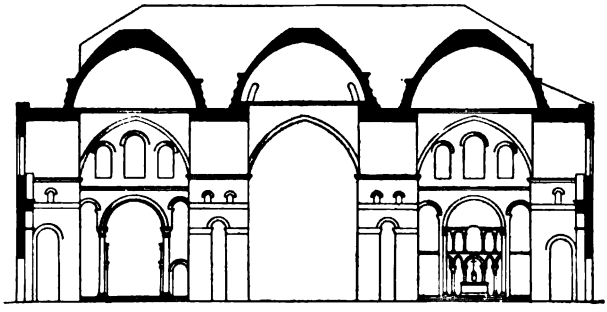
Burgundy was a province rich in monastic buildings, which exercised much influence over the architecture of other ecclesiastical structures.

In Normandy, many fine buildings were erected, owing to the power and prosperity of the Norman dukes. The examples are of the basilican plan, with vaulted roofs, which show the gradual development toward the pointed arch.

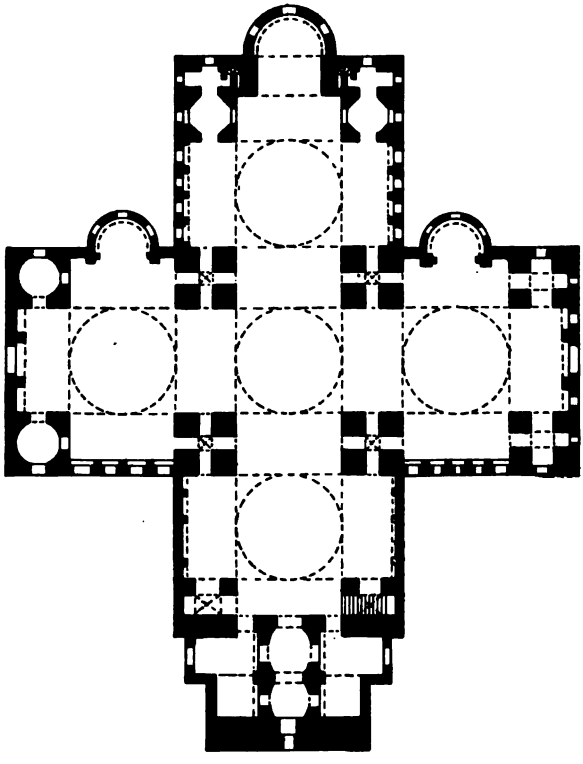
EXAMPLES

88. Church of St. Front.—The church of St. Front, at Perigueux, Fig. 36, presents one of the most important examples of the Romanesque period in Southern France. It was the work of the Romanesque builders, but owing to the trade that Southern France carried on with the Orient, and the taste acquired by returning pilgrims from the Holy Land, a strong Byzantine influence was brought to bear on the construction, and it presents a domical design.

The plan, Fig. 37 (*b*), was undoubtedly patterned after St. Mark's Church, at Venice, but the domes over the arms and crossing are all of one size and are surmounted with lanterns as shown in Fig. 36. Unlike St. Mark's, however, the interior, Fig. 38, is extremely plain. No Oriental marbles embellish the walls here, nor do elaborate mosaics incrust



(*a*)



(*b*)

FIG. 37

FIG 38

the dome soffits; but simple and imposing construction gives scale to the interior and an expression of grandeur equal to that attained by its more elaborate prototype. Fig. 38 shows clearly the great rectangular piers, pierced in two directions with passages and supporting the pendentives above, which are crowned with the great hemispherical dome. Compare Fig. 38 with Fig. 37 (*a*), Fig. 10, and Fig. 2.

89. Church of St. Croix.—Not far from Perigueux, on the western coast of France, is the city of Bordeaux, in which is located the church of St. Croix, Fig. 39. This

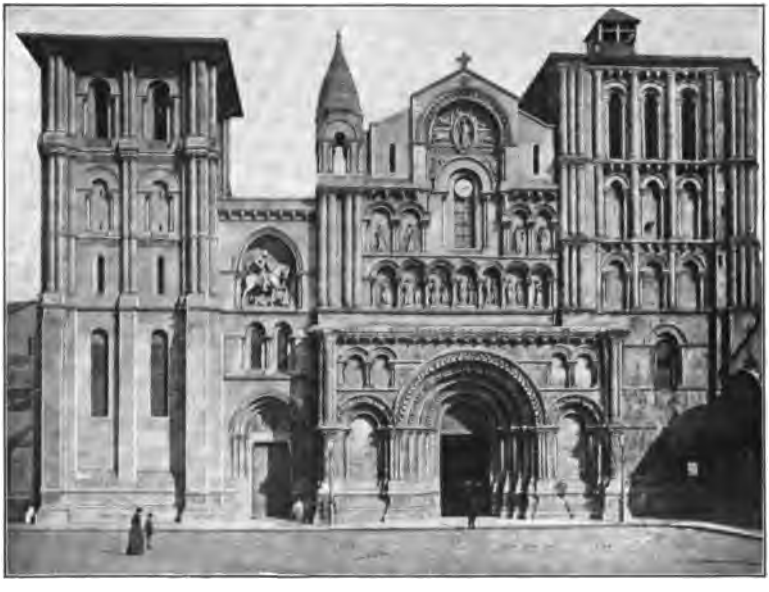


FIG. 39

edifice was originally founded in about the 7th century, but it was rebuilt in the 10th century and has been restored several times since. The façade is characteristically Romanesque with its blind arcades and recessed portals, and elaborate sculptured figures fill numerous niches. Most of this sculpture has fallen into decay, however, and the only

recognizable details are the signs of the zodiac, under the arch of the central gable, and a statue of a knight slaying a dragon, in a niche over the side portal. Superposed columns supporting arches are used here, but there is no suggestion of an imitation of classic design. There are sill courses marking the stories, but no entablatures are placed

FIG. 40

over the columns. Columns are clustered in groups of two or three or more—not according to any classic rules, but to suit the conditions arising in each case.

90. Church of Notre Dame le Grande.—In Fig. 40 is shown the church of Notre Dame le Grande, at Poitiers. This is one of the most characteristic Romanesque edifices of Central France, and was built in the 12th century, when

FIG. 41

external sculpture and internal mural decoration were the prevailing means of attaining architectural expression. The western façade of this structure is richly sculptured

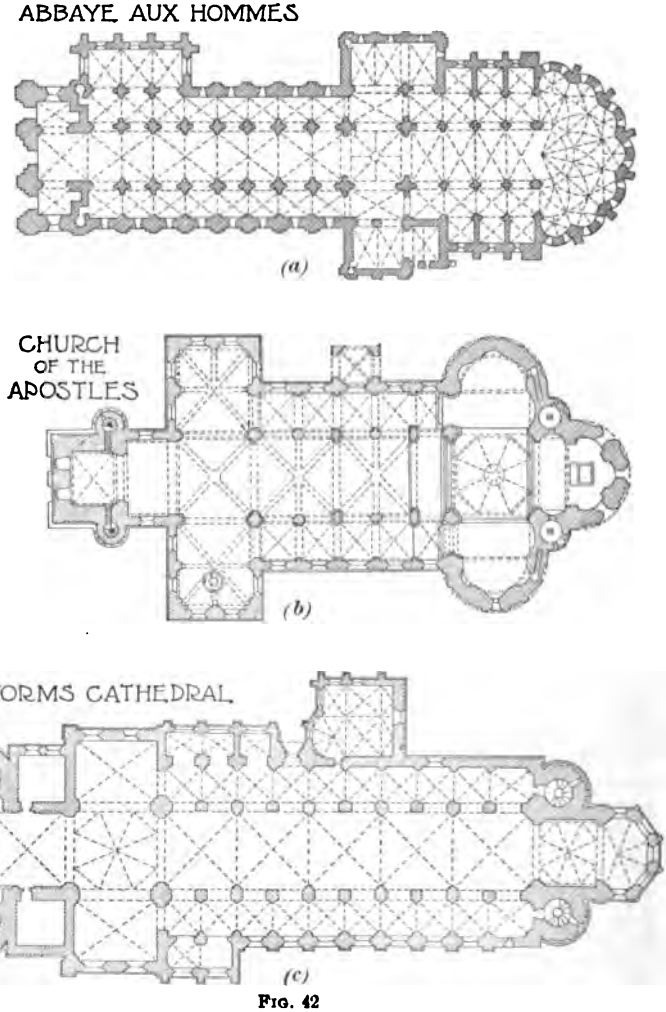


FIG. 42

with surface ornament, as well as with statues of saints, kings, bishops, and other symbolic effigies. Though not the largest, this church is probably the most interesting one

in the province, as it surpasses every other structure in the richness of its decoration. The central window was originally circular, but in the 15th century it was cut down to give more area for stained glass.

91. Abbaye Aux Hommes.—The Abbaye aux Hommes, Fig. 41, at Caen, was commenced in 1066 by William the Conqueror. The plan originally had an eastern apse, but this was altered to the semicircular *chevet* termination so characteristic of the French style [see Fig. 42 (*a*)]. The *chevet* consists of a continuation of the aisles around the east end of the nave, so as to form an *ambulatory* or passageway for the religious processions that were introduced into the church ritual about this time.

ANALYTICAL STUDY

PLANS

92. The plans in the south were broad and open with internal buttresses, between which chapels were arranged, while in the north they were more like the basilica, with external buttresses to receive the thrust of the roof vaults.

WALLS

93. The walls were massive constructions of rubble with a facing of fine ashlar. The doorways were elaborate, but the rest of the façade was left in the simplest possible form. Imposing western entrances are characteristic of this style. The buttresses have only very slight projection, and flying buttresses were introduced in the last half of the 12th century. The towers were mostly square with pyramidal roofs.

ROOFS

94. In the south, the roofs consisted of a barrel vault over the nave with half vaults over the aisles, which, being two stories in height, would not admit the introduction of a

clearstory. In the north, an increased clearstory was characteristic, owing to the use of intersecting vaults in the nave and grouped windows in the spandrels. The groin ribs of the nave vaults were maintained by buttressed arches under the aisle roofs, which received their thrusts.

COLUMNS

95. In the naves, square piers with half-round columns attached to their faces supported the groin ribs; or columns, with capitals suggestive of Corinthian style, received the groin ribs rather clumsily on the abacus.

OPENINGS

96. In the south, the openings were narrow, with wide splay of the jambs, and the clearstory was usually omitted. In the north the openings were grouped in series of three and five narrow windows, to fill the spandrel of the vaults in the clearstories. Portals were extremely ornate.

MOLDINGS

97. Moldings in the south are neat and refined, due to classic influence, but in the north, they are crude devices cut with an ax on the structural details. Corbel tables supported by either grotesque heads or plain blocks form the cornices along the main walls.

ORNAMENT

98. Painted glass did not enter into the designs in Southern France, as the windows were small and narrow and thus did not favor its display; but its use was gradually developed for the large openings in the northern buildings. The northern buildings presented much decorative diaper treatment in the spandrels of the arches that probably arose from an attempt to imitate in carving the color patterns of draperies that originally occupied the same positions.

GERMAN ROMANESQUE

INFLUENCES

99. Geographical.—During the days of the Roman Empire, cities had been established on the banks of the Rhine and to the south of it, and, when Christianity spread over Europe, these parts were affected first, while, in the north and east, paganism still flourished (see Fig. 43).

100. Geological.—Stone was abundant along the Rhine, but in the northern plains there was none. Consequently, the character of the buildings in these two districts varied accordingly.

101. Climatic.—Germany is subject to extremes of climate. In winter there is much snow for four months, and in summer the weather is decidedly warm, though not excessively hot.

102. Religious.—Charlemagne being a strong supporter of Christianity, forced his religion on the Saxons. The conversion of the barbaric tribes made the ceremony of baptism one of great importance.

103. Political and Historical.—After the death of Charlemagne (814 A. D.) the portion of his empire that fell to Lewis (see Fig. 26) became one of the three great subdivisions. The chief power in the country gradually became vested in the great dukes and lords, just as had been the condition in France. In 911 A. D., the last descendant of Charlemagne died, and as there was no satisfactory heir to the throne, five of the great dukes got together and elected Conrad, Duke of Franconia, as their king. Thus Germany began as an elective kingdom. On the death of Conrad, a Saxon duke named Henry was elected king, and he was

the first of five Saxon kings under whose reigns Germany was to become the greatest power in Europe. Otho, successor of Henry, extended the boundary of the German Empire southwards to include Lombardy. After the subdivision of Charlemagne's dominion the Roman Empire ceased to exist, but with the establishment of the temporal power of the church, it was desired that the church should extend its influence and power over as wide a domain as

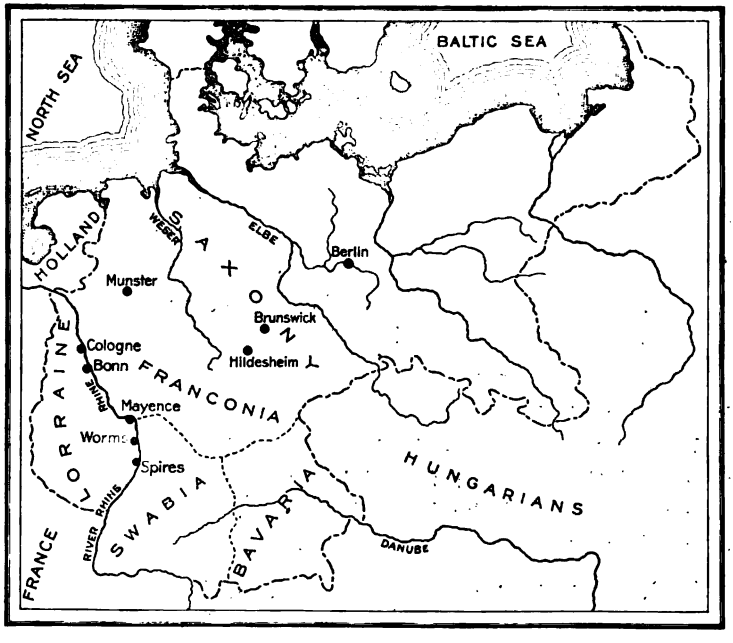


FIG. 43

possible. Otho being an ardent churchman, as well as an ambitious sovereign, acquiesced in this idea, and in 962 A. D. he was crowned at Rome as emperor of the Holy Roman Empire of the West. Thus, a portion of the divided empire of Charlemagne became united. From this time on each German emperor received three coronations—as king of Germany, as king of Italy, and as emperor of the West.

CHARACTERISTICS

104. The general style of German Romanesque architecture is similar to that of Northern Italy, and though the Rhine districts present the best examples, there are fewer local characteristics than are found in France. Numerous circular and octagonal turrets with arcaded galleries under the eaves characterize the style. The church plans show no western entrances, but present apses instead, Fig. 42 (*b*) and (*c*). The doorways are richly ornamented, and the capitals of the columns are bold in execution and unique in design. Vaulting appears about 50 years later than in France, and was first adopted in the provinces along the Rhine. The round-arched style, similar to that of Lombardy, lasted in Germany until about 1268 A. D.

EXAMPLES

105. Church of the Apostles.—The church of the Apostles, at Cologne, Fig. 44, is only one of several in that city that presents the leading characteristics of the German Romanesque style. The eastern end is carried out in three apses that open from three sides of the nave and are crowned by a low, octagonal tower, Fig. 42 (*b*). The exterior is richly treated, and presents arcaded subdivisions crowned by a characteristic arcade of small arches under the eaves of the roof. The existence of these small arcades under the eaves of the structures in Germany and Lombardy is interesting, inasmuch as they are based on a structural condition. The buildings not being vaulted in these countries, there was no thrust on the upper walls; consequently, a light form of construction was permissible here for the purpose of supporting the beams of the roof.

The walls had simply to support the superimposed load of the roof and roof trusses and did not have to withstand a horizontal thrust from vaults. There were therefore no flying buttresses over the aisles although fixed buttresses were necessary to support the aisle vaults.

FIG. 44

FIG. 45

FIG. 46.

106. Cathedral at Worms.—The Worms Cathedral, Fig. 45 (also those of Speyer, Mentz, and Treves), is a characteristic structure of this period. On each side of the eastern and the western apse stand circular towers, while a low, octagonal tower marks the intersection of the nave and the transept. The walls are pierced with semicircular-headed windows that are flanked by small pilaster buttresses, and the entrance doors are at the sides, as is characteristic of many of the German churches [see the plans, Fig. 42 (*b*) and (*c*)].

The interior of Worms Cathedral, Fig. 46, shows the characteristic German Romanesque arrangement. Semicircular ribs laid up in small cut arch stones extend diagonally from one corner of a bay to another, while the transverse ribs in slightly pointed arches separate the bays from one another. The nave wall is supported by rectangular piers, on every other one of which a semicylindrical shaft rises to the clerestory to receive the vault ribs. Two arches of the aisle vaults are included under each bay of the nave vaults.

107. Cathedral at Speyer.—The Speyer Cathedral, Fig. 47, presents square towers where those of the Worms Cathedral are round, while a light arcade under the eaves of the roof indicates the absence of vaulting, as in the Italian Romanesque.

108. Cathedral at Bonn.—The cathedral at Bonn, Fig. 48, introduces an octagonal tower of two stories with a tall spire over the intersection of the nave, but otherwise it presents practically the same features as the cathedral at Speyer.

109. All of these great churches are noteworthy for their picturesque grouping of external details and the successful combination of large and small turrets in one composition. The characteristic use of arcades in the exterior walls and the open arcades under the eaves render these German examples unique among the Romanesque structures in other countries, although the system of design was undoubtedly derived from the churches of Northern Italy.

FIG 47

FIG. 48

ANALYTICAL STUDY

PLANS

110. In the German Romanesque style, the naves and aisles were vaulted over square bays, one bay of the nave receiving two from the aisles, as the latter were usually half the width of the nave. The choir ended in an apse, and was always raised over a crypt, as in Lombardy. Transepts were introduced at the west end as well as at the east, detracting somewhat from the cruciform plan, but they were nearly always crowned with low, octagonal towers. Numerous square or cylindrical towers added to the exterior effect. These towers are generally constructed in successive stories and finished under four gables and a steep, pyramidal roof, the hip rafters rising from the ridge of the gables, as in Fig. 48, and sometimes from the valleys between them as well, as in Fig. 47.

WALLS

111. The walls present open arcades under the eaves and string courses, or cornices consisting of horizontal arcades, resting on corbels. There is always a clearstory and occasionally a *triforium*, or open space, between the clearstory and aisle vaults.

ROOFS

112. Along the Rhine, barrel vaults covered the nave, and half vaults extended from the walls over the aisles to the base of the nave vault. Where the spans were excessive, timber trusses were used. Characteristic gabled and pyramidal roofs covered the towers, as heretofore described.

COLUMNS

113. Square piers with half columns attached were used in the nave, and in many churches a characteristic arrangement consisted of alternate piers and columns. The capitals are boldly executed and designed with care and intelligence.

OPENINGS

114. The openings are usually single, but occasionally they are subdivided by mullions, as in Fig. 49 (*a*), which

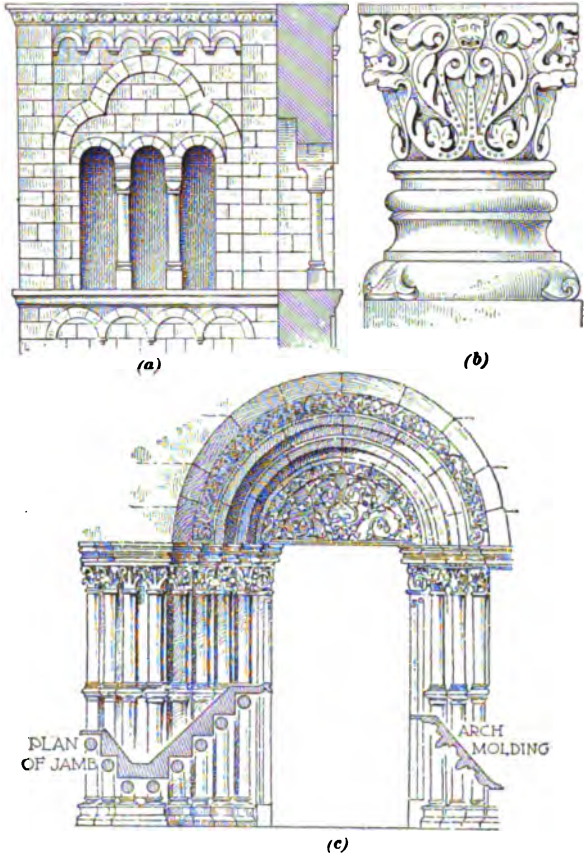


FIG. 49

shows an example from the Laach Abbey Church. The doors are placed at the sides and rarely at the ends.

MOLDINGS

115. The moldings are of little importance and form no characteristic part of the style. The bases of the columns, however, show a divergence from the classic proportions, and suggest ideas that develop in a later style.

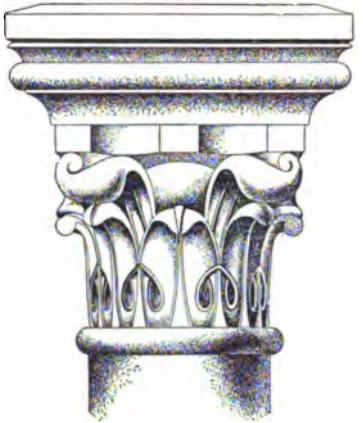
ORNAMENT

116. The flat, plain surfaces on the interior walls were sometimes frescoed in colored designs that expressed the ideas set forth in the early Christian and Byzantine decorations. In the northern part of Germany, colored bricks and tiles were used, but being unsuitable for rich decoration there is an absence of sculptured foliage.

The arches of the portals, when of stone, were richly carved, as may be seen in Fig. 49 (*c*), which is an example from the Worms Cathedral, as are also the capital and base shown in (*b*). The introduction of a leaf form on the corners of the plinth, to fill the triangular space caused by the moldings at the base, is characteristic of this period. Fig. 50 (*f*).

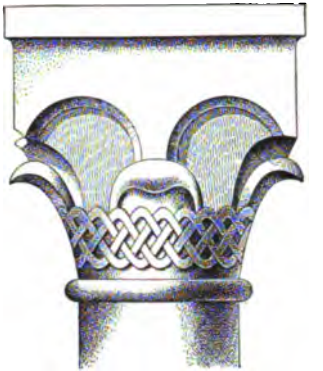
117. In Fig. 50 (*c*) is shown a 13th-century capital from Southern Germany, the treatment of the foliage on which is extremely simple and thoroughly pleasing. It is lighter than either the French or Italian examples shown at (*a*) and (*e*), respectively, and its conventional foliage seems to grow from the top of the shaft. The base at (*f*) is also German, but differs only slightly from the French bases at (*b*) and (*d*).

118. The running ornament illustrated in Fig. 51 is carved in high relief. The example at (*a*) was taken from Southern Germany, and is much heavier in detail than the French example at (*b*). The pyramid forms shown on the main stem of the ornament at (*c*) are characteristic of the Romanesque style, and are found at this period throughout Western Europe. The band shown at (*d*) is a trifle more intricate than the others, but presents the same simple elements as the example shown at (*a*).



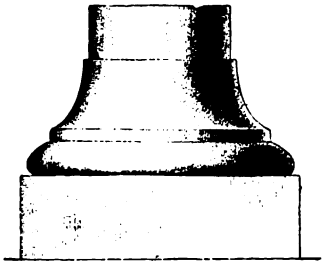
(a)

(c)

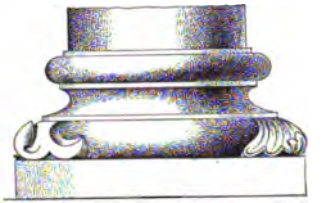


(e)

(b)



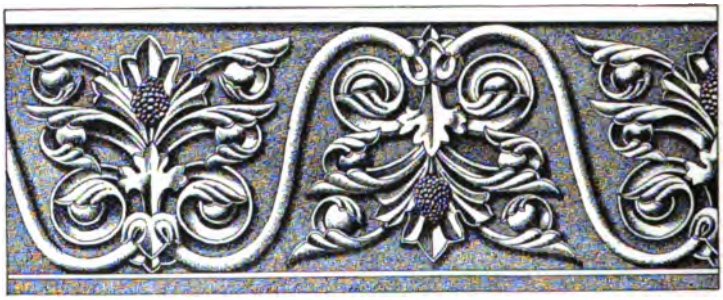
(d)



(f)

FIG. 50

(a)



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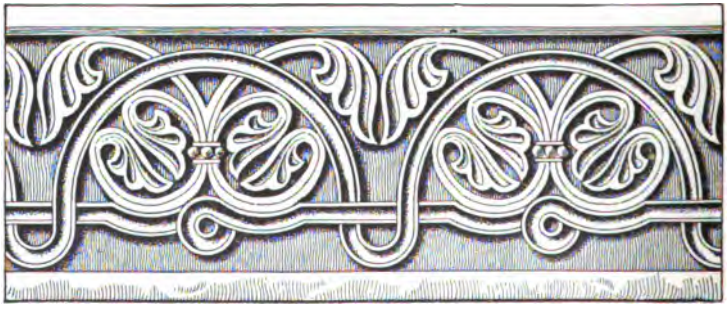

(d)

FIG 51

THE CRUSADES

(1096 A. D. TO 1270 A. D.)

119. During the two hundred years comprising the 12th and 13th centuries, the most important developments in European history were affected by a series of extraordinary expeditions known as the *crusades*, a word of French derivation meaning "wars of the cross." Since the latter part of the 7th century, Syria and Palestine had been in the hands of the Saracens and Turks, both of whom were Mohammedans. It had long been the practice for ardent Christians to make pilgrimages to Jerusalem, and while the Saracens remained masters of the Holy Land these pilgrims were cordially received, as a considerable amount of revenue and trade was thus brought to that country.

In the middle of the 11th century, however, the Seljukian Turks became rulers of Syria and subjected the Christians to the cruelest persecutions. Returning pilgrims told sickening stories of insults and degradations that had been heaped on them by the "infidels," and a spontaneous desire arose throughout Europe to exterminate the Mohammedans, and rescue the Holy Land from their domination. A French monk, Peter the Hermit, born at Amiens, was a victim of some of these Moslem cruelties, and believing that he was inspired by heaven to deliver Jerusalem, he laid the project of the first crusade before Pope Urban II. Encouraged by the pope, Peter traveled over Europe and preached that it was the sacred duty of all Christians to deliver the Sepulcher of Christ from the infidels. As a result, a great multitude from all parts of Europe assembled, on call from the pope, at Clermont, France, in 1095 A. D. Unfortunately, in their enthusiasm, they were carried away by the eloquence of Peter and urged him, as the original preacher of the sacred enterprise, to assume its command, and, not knowing his

utter unfitness for military command, Peter accepted the charge.

120. First Crusade—1096 to 1099.—In August, 1096 A. D., an unorganized army of over 250,000 men started as an advance guard on a march through Germany, Hungary, Bulgaria, and Thrace (see Fig. 52). This army expected to live by forage and conscription as it proceeded, but its lawless acts and devastations so enraged the Hungarian peasantry that they attacked the crusaders and nearly exterminated them before they reached their goal, and the few that succeeded in getting across the Bosporus were immediately

FIG. 52

massacred by the Turks. Such was the fate of the vanguard of the first crusade.

121. The chivalry of Europe had taken no part in this preliminary movement, but now it prepared to follow the vanguard. Six armies, each consisting of 100,000 men, started by different routes (see Fig. 52) from separate countries for Constantinople. Here all the divisions united, under Godfrey of Bouillon, duke of Lower Lorain, and 100,000 mailed cavalry, the flower of European chivalry—knights, esquires, and men at arms—marched across Asia

Minor. They were equipped with full armor, and were armed with lance, sword, and battle ax or heavy iron mace. The foot soldiers were armed with longbows and crossbows, and presented a strong contrast to the splendor of the knights with their embroidered and ermined surcoats, dazzling shields, and headpieces inlaid with gold and jewels. As soon as they entered Asia Minor, the sultan of Roum, with 300,000 cavalry, attacked them, but the heavy-weaponed and armored knights and horses of the crusaders were too much against the light weapons and supple dexterity of the Asiatics. In a direct charge, the Turkish cavalry was routed and 30,000 slain. This was probably the greatest cavalry battle in the world's history. The retreating Turks, however, devastated the country through which the victors had to march, and hundreds of the crusaders died of famine and disease before they arrived at the city of Antioch, the capital of Syria, to which they laid siege. Seven months later the crusaders captured the city and marched on to Jerusalem. For five weeks Jerusalem was besieged, but in July, 1099, Godfrey and his army entered the city and celebrated their great Christian victory by the massacre of 70,000 Moslems and the burning of the Jews in their synagogues. Thus ended the first crusade, and Jerusalem was now a Christian kingdom after 450 years of Mohammedan rule.

122. Second Crusade—1147 to 1149.—In 1145, the Turks attacked the Christian principality of Edessa and massacred the inhabitants. St. Bernard, abbot of the monastery at Clairaux, preached a second crusade as a punishment to the infidels, and his eloquence enlisted the sympathies of the two most powerful sovereigns of Europe, Conrad III of Germany, and Louis VII of France.

The two armies, consisting of over 300,000 chosen troops, marched by the same route as the first crusaders to Constantinople, but they were badly defeated and returned to their homes without accomplishing anything.

123. Third Crusade—1189 to 1192.—The third crusade was caused by the invasion of Palestine by the Turks

and the fall of Jerusalem in 1187. Tyre now remained the only Christian settlement in Palestine. The third crusade was conducted by Richard I of England, Philip Augustus of France, and Frederick I of Germany, and ended in a truce with the Turks.

124. Result of the Crusades.—There were five later crusades, but none of them achieved any result; in fact some of them were not directed toward Jerusalem at all. Although the crusaders failed utterly to accomplish their immediate object—the recovery of the Holy Land from the Mohammedans—their effects were most important on the development of western civilization. Western nations having come to act together in a common cause, became better acquainted, exchanged chivalrous sentiments, and entertained more liberal ideas. The returning crusaders brought from the East knowledge of many processes and products tending to promote the arts and industries of the West. These expeditions were the beginning of international commercial relations. The Italian maritime states furnished the crusaders with transports and conveyed their troops and supplies, thus first establishing the commerce of the Mediterranean. A demand for spices, perfumes, and other articles of Oriental luxury was imported into Europe. Trading posts were established on the coasts of Asia Minor and Greece by Venice, Genoa, and other Italian states. Another important effect of the crusades was the diminishing of the strength of the feudal aristocracy through the division and sale of many feudal properties.

It is evident that in the immense host that constituted these armies some designation other than a mere name was necessary to distinguish one nobleman from another; hence, we find the introduction of coats of arms and distinctive banners, and finally the use of surnames, which had heretofore been unnecessary.

From the 11th to the 13th century, the crusaders returning from the Orient introduced new ideas and aided in the foundation of the great universities. With the spread of

education and enlightenment, the feudal system began to decline, and finally, in 1500, when gunpowder was invented, warfare was revolutionized and the feudal system of government and defense became obsolete.

REVIEW EXERCISES

1. What geographical influences affected the architecture of Northern and Southern Italy?

2. What important religious influence affected the political conditions in Italy during the early Romanesque period?

3. What are the leading characteristics of (*a*) Northern Italian Romanesque architecture? (*b*) Southern Italian Romanesque?

4. (*a*) What are the characteristics of Romanesque architecture in the north and south of France? (*b*) What is assumed as the dividing line between Northern and Southern France?

5. (*a*) What is the most important Romanesque church in France? (*b*) After what was it patterned?

6. (*a*) What foreign influences affected the architecture of Southern France? (*b*) How came these influences to be introduced?

7. (*a*) What are the characteristics of German Romanesque? (*b*) What characteristics were due to the proximity of Northern Italy?

8. (*a*) What were the Crusades? (*b*) What effect did they have on the civilization of Western Europe?

9. (*a*) What is a chevet? (*b*) Of what style of architecture was it characteristic?

10. In what way did the absence of vaulting affect the Romanesque style of Northern Italy and Southern France?

INDEX

NOTE.—All items in this index refer first to the section (see the Preface) and then to the page of the section. Thus, "Anthemion ornament, §50, p74," means that Anthemion ornament will be found on page 74 of section 50.